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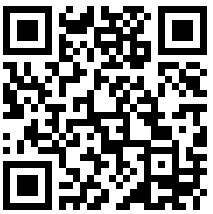

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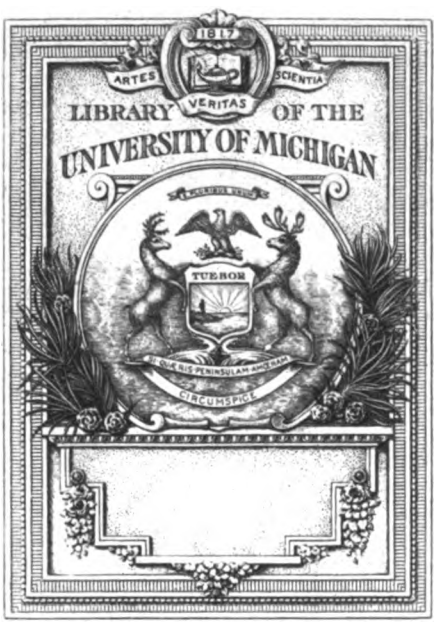

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A

MONOGRAPH

OF THE

PIERINE GENUS *Delias*

BY

G. TALBOT

PART I.

To be completed in several parts with many coloured and other plates.

Issued June 23rd, 1928

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A MONOGRAPH OF THE PIERINE GENUS DELIAS.

By G. TALBOT.

1.—Introduction.

At the Hill Museum, Mr. J. J. Joicey has caused special attention to be given to the *Delias* group for many years, with the result that the collection of this group is now perhaps the largest in the world. The brothers Pratt made several long collecting trips in New Guinea and the Malay Islands, and, searching especially for *Delias*, they have added very largely to our knowledge. When the work of Seitz was published in 1911, the number of forms enumerated totalled 231, but now after sixteen years we have knowledge of 405 forms. This increase is due mostly to the labours of the collectors Pratt and Meek. If we allow for the suppression of thirteen names given in "Seitz," there is an increase of 187.

The range of the genus extends from China to the Pacific and Australia, and geographical variation is very great. Transitional variations are rare, sexual dimorphism is frequent, and female polymorphism occurs in some species.

It is probable that the genus *Huphina*, from the point of view of its range, its build, general pattern, neuration, and scent-scale, provided the ancestral form of *Delias*, a form with a black or white or yellow under surface to the hind wing, without definite pattern. The evolution of the group has apparently proceeded along several lines with numerous branchings. In the mountain forms of New Guinea specialization has resulted in the most diverse and distinct patterns, so that their relationships are too obscure to be unravelled just yet. An intensive study of these forms is necessary before one can understand their derivations and point to the lines along which they have been evolved.

The work of classifying the forms of this genus has proved a difficult one, and future discoveries may necessitate some changes. Every known species, with the exception of a few unique specimens, has been dissected at the Hill Museum, and similarly from these forms mounts have been prepared of the scent-scales on the fore wing.

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The scent-scales have been studied by Mr. Francis Ball of Brussels, who has long interested himself in these structures. The result of Mr. Ball's studies has enabled us to make important use of the scent-scale in classification. Mr. Ball is responsible for the drawings of the scales. The drawings of genitalia were prepared by our assistant, Mr. Neville Bennett, who also carried out the dissections.

The valve exhibits much variation with transitional forms, and is in most cases unreliable as a taxonomic character. The uncus exhibits several well-marked types, which, whilst helpful in certain groups, are of no value in others. On the whole the scent-scale has proved more reliable than the other structures, and we have been guided largely by it. Well-defined species and subspecies show distinct differences in the genitalia. In the genital armature of the female the bursa copulatrix is furnished with a chitinized plate of variable form. This organ appears to have some taxonomic value, as we shall show later.

The *Delias* proper are divided roughly into two sections, one with a small disc to the scent-scale, and one with a large disc. On general characters we have further divided them into nineteen groups. Then again, owing to the specific shape and exceptionally large disc in the scales of another group, combined with a constant feature in the genitalia, we feel obliged to resuscitate the name *Piccarda* Grote, to form a subgenus.

Acknowledgment of kind help received is due to the following gentlemen: Mr. Francis J. Ball (as noted already in connection with the scent-scales), Lord Rothschild and Dr. K. Jordan of the Tring Museum, Capt. N. D. Riley of the Natural History Museum, Dr. Baron Von Rosen of the Munich Museum, Mr. John Levick (who gave facilities for studying the collection made by the late Charles Oberthür), Monsieur and Madame le Comte and Comtesse de Mileant (who gave facilities for studying the collection made by the late Hans Fruhstorfer), Monsieur F. Le Cerf of the Paris Museum, to the authorities of the Brussels Museum, and to Dr. Van Eecke of the Leiden Museum.

Individual acknowledgment for special services rendered is accorded in the text, but we must refer here to the generosity of Dr. Baron von Rosen, who made it possible for us to prepare drawings and dissections and to examine scales of some unique forms in the Munich Museum. Similarly, Mr. Levick sent us for microscopical examination and description, the unique male of *ellipsis*, and Lord Rothschild sent us the type of *levicki* for figuring.

This monograph is prepared under the auspices of Mr. J. J. Joicey,

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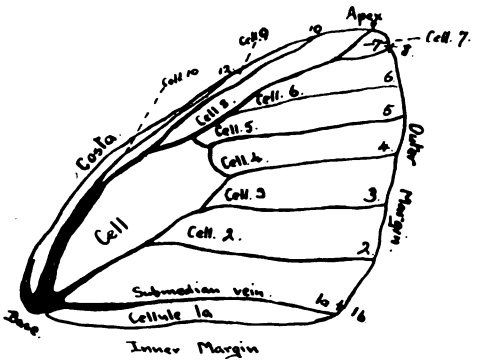
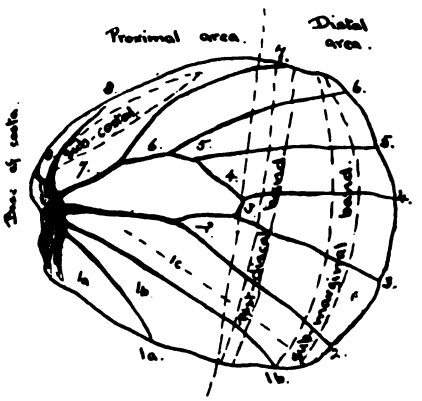
who has persevered for many years in obtaining material, and to whom the author is indebted for all facilities in carrying out the work.

To enable the student to identify the species and to arrange his collection, pending the conclusion of this monograph, we give a key to each sex, a catalogue of all known forms, and a table of distribution.



Fore Wing.



Hind Wing.

Delias neuration and nomenclature.

2.—Key to Forms of Delias.

Males.

(The number following the species indicates the order of its arrangement in the monograph, and also includes the races unless otherwise noted.)

Section I. Hind wing below without a red postdiscal or submarginal line, or with red submarginal spots.[1]

Section II. Hind wing below with a red postdiscal or submarginal line, and no red submarginal spots.

---

[1] The postdiscal and submarginal position is indicated by (a) the distance (measured along vein 3) between the origin of vein 3 and the outer edge of the spot as compared with (b), the distance between the outer edge of the spot and the margin. In the postdiscal position the distance *a* is shorter than *b*. In the submarginal position the distance *a* is longer than *b*.

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Section I.	Hind wing below with submarginal spots or patches either separated or forming a band	*A*
	Hind wing below with a large yellow basal spot in 8 and a larger one in 7	*B*
	Hind wing below without submarginal spots ...	*C*
A.	Hind wing below with submarginal spots, not red[1]	1
	Hind wing below with submarginal spots red, reddish-brown or brown	45
1.	Hind wing below without a subbasal or subcostal red stripe	2
	Hind wing below with a subbasal or subcostal red stripe	41
2.	Hind wing below with the costa, at least at its base differently coloured to the basal or discal area of wing. Species mostly without yellow ground-colour	3
	Hind wing below with the costa, at least for its basal third, of same colour as the basal area of wing. Species mostly with yellow ground-colour	24
3.	Hind wing below with a yellow and white or white discal band, either entire or of spots	4
	Hind wing below without a yellow or white discal band	15
4.	Hind wing below with a yellow, orange, or white cell-spot or stripe	5
	Hind wing below without a cell-spot	14
5.	Hind wing below with a free subcostal spot in 7 between the base and the discal band ...	6
	Hind wing below without a subcostal spot in 7 ...	9
6.	Fore wing above with black distal area ...	7
	Fore wing above without a black distal area ...	8
7.	Hind wing below with yellow submarginal dots	*cuningputi* 89
	Hind wing below with yellow submarginal spots	*aroae & pheres*
	Fore wing below with white area not reaching upper margin of cell or is reduced proximally ...	*pheres* 90
	Fore wing below with white area more extended in the cell	*aroae* 97
8.	Fore wing below black-brown, with yellow subapical spots	*fuliginosus* 98
	Fore wing below with yellow discal band ...	*imitator* 76
9.	Hind wing below without a distinct yellow or orange submedian line	10
	Hind wing below with a distinct yellow or orange submedian line	11

[1] Vestiges only in *leeerfi*. In *simanubum* the submarginal spots are replaced by patches which are not distinctly separated from the yellow proximal area. In *maudei* the two anterior spots are on the margin.

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10. Both wings yellow above, and discal band on hind wing below white in the anterior half ... *citrona* 86
Hind wing below with a yellow cell-spot ... *geraldina* 68
11. Hind wing below with an orange submedian line 12
Hind wing below with a yellow submedian line 13
12. Hind wing below with an orange cell-stripe and no marginal spots ... ... *leucobalia* 103
Hind wing below with an orange cell-stripe and white marginal spots ... ... *carstensziana* 102
13. Fore wing below with large orange distal area ... *eichhorni* 100
Fore wing below without orange ... ... *catisa* 105
14. Hind wing below with a yellow discocellular spot and a yellow discal band in the posterior half ... *chrysomelaena* 50
Hind wing below with a discal band of spots ... *momea* 30
Hind wing below with entire white discal band ... *fruhstorferi* 31
15. Hind wing below with a cell-spot 16
Hind wing below without a cell-spot 19
16. Hind wing below with cell-spot black ... ... *nigropunctata* 84
Hind wing below with cell-spot yellow ... 17
Hind wing below with cell-spot not yellow ... 18
17. Hind wing below with basal spot yellow ... *flavopicta* 73
Hind wing below with basal spot red and fore wing below with black-brown ground colour ... *microsticha* 70
Hind wing below with basal spot red and fore wing below with white ground-colour (submarginal spots vestigial) ... ... *lecerfi* 66
Hind wing below with the costa white, yellow at base ... ... *rileyi* 75
18. Hind wing below with cell-spot red, and without internervular red stripes ... ... *thompsoni* 85
Hind wing below with cell-spot red (sometimes absent), and with internervular red stripes ... *rubrostriata* 78
19. Hind wing below with a discocellular mark or discal patch 20
Hind wing below without a discocellular mark or discal patch 21
20. Hind wing below with a large rounded yellow or white discal patch... ... ... *georgina* 14
Hind wing below with a discocellular white streak *manuselensis* 25
Hind wing below with a round discocellular white spot ... ... *stresemanni* 61
Hind wing below with a rounded sharply-defined black discal patch on a grey-black ground ... *heroni* 81
Hind wing below as in *heroni* but with a white ground ... ... *albo-oculatus* 82
Hind wing below with a diffuse black discal patch *hypomelas* 77
21. Hind wing below with yellow submarginal spots 22
Hind wing below with orange or white submarginal spots 23

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22. Fore wing above with large black apical area, and no yellow submedian area on the hind wing below *huphinoides* 29
Fore wing above with narrow black apical area and distinct white submarginal spots, below with dark brown distal area ... ... *hageni* 28
Hind wing below with yellow submedian area ... *vidua* 23
Hind wing below with submedian area only slightly dusted with yellow, and fore wing below mostly white ... ... *eschatia* 24
23. Hind wing below with orange submarginal dots ... *nysa* 32
Hind wing below with white submarginal spots ... *talboti* 52
Hind wing below with a broken-up white submarginal line and large white costal area ... *itamputi* 83
24. Hind wing below mostly yellow with black or dark brown marginal band 25
Hind wing below yellow in basal area, and white or dark brown in distal area 35
25. Hind wing below with large yellow or white submarginal spots. (In *simanubum* the spots are patches which are scarcely separated from the proximal area) 32
Hind wing below with medium to small yellow, orange, or white submarginal spots. In *kuchni* the spots are variable) 26
26. Hind wing below with submarginal spots orange 27
Hind wing below with submarginal spots yellow or white 29
27. Fore wing below with subapical spots white and yellow ... ... *multicolor* 326
Fore wing below with subapical spots white ... 28
28. Hind wing below with marginal band reaching the costa... ... ... *alberti* 307
Hind wing below with marginal band not reaching the costa, yellow proximal area not extending beyond the cell ... ... *bosnikiana* 315
Hind wing below with marginal band not reaching the costa and yellow proximal area extending beyond the cell ... ... *sacha* 310
29. Hind wing below with white or yellow submarginal spots, and orange median area ... *biaka* 290
Hind wing below with yellow submarginal spots and orange median area.
Hind wing above with black dentate margin ... *dorylaea* 283
Hind wing below with yellow submarginal spots and slight orange area.
Fore wing with black apical area and hind wing with the marginal band entire ... ... *callistrate* 302
Hind wing below with white submarginal spots... 30
Hind wing below with yellow submarginal spots and anal area not orange 31

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30. Hind wing above white and fringes white ... *agostina* 274
Hind wing above white with black marginal marks; below with black vein-stripes ... *baracasa* 278
Hind wing above white with black marginal marks; below without black vein-stripes ... *agoranis* 1
Hind wing above white with narrow black margin; below with no vein-stripes. Fore wing below with defined dark costal border ... *gabia* 293
Hind wing above with yellow proximal half ... *blanca* 18

31. Fore wing below with black ground-colour, costal spots, and large white subapical spots ... *kuchni* 8
Fore wing below with white proximal and dark brown distal area, yellow submarginal spots ... *ribbei* 34
Fore wing above and below black, with medium yellowish-white subapical spots only ... ... *dorimene* 284
Fore wing white above, black below, with white subapical spots ... ... *hippodamia* 291
Fore wing with costa and a discocellular bar black-brown and usually merged together. ... ... species 35, 37, 44
Hind wing with anterior submarginal spot larger than the one below it ... ... *enniana* 37
Same as *enniana*, submarginal spots large and close to margin ... ... *maudei* 35
Hind wing with anterior submarginal spot not larger than the one below; submarginal spots small or obsolete ... ... *dice* 44

32. Fore wing below with white ground-colour ... 33
Fore wing below with black ground-colour ... 34

33. Hind wing above white with black or dusky marginal band; below with black vein-stripes... *singhapura* 2
Hind wing above white with black or dusky marginal band; below without black vein-stripes *themis* 5
Hind wing above without a marginal band ... *simanubum* 12

34. Hind wing above white with black magin ... *echidna* 287
Hind wing above with white marginal band and white inner marginal area ... ... *melusina* 277
Hind wing above yellow with dark brown margin *waterstradti* 27

35. Hind wing below with yellow or orange sub-marginal spots 36
Hind wing below with small white submarginal spots 40

36. Hind wing below yellow and white with black marginal band 37
Hind wing below yellow with dark brown distal area ... ... *isse* 308

37. Hind wing below with small orange submarginal spots 38
Hind wing below with small yellow submarginal spots ... ... *enniana kapaura* 39

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Hind wing below with large orange or yellow submarginal spots 39

38. Hind wing below white with yellow basal area and dark brown margin which does not extend beyond vein 6 ... ... *ennia* 317
39. Hind wing above white ... ... *candida* 312
40. Hing wing below with yellow basal area ... *lytaea* 327
41. Hind wing below with large white submarginal spots ... ... *diaphana* 270

Hind wing below with medium submarginal spots 42

42. Hind below with subcostal red stripe short and not extending beyond middle of costa; upperside white ... ... *zebuda* 256

Hind wing below with subcostal red stripe short and upperside orange ... ... *madetes* 259

Hind wing below with subcostal red stripe long and extending beyond middle of costa ... 43

43. Hind wing below yellow or orange 44

Hind wing below olive-green ... ... *levicki* 255

44. Fore wing above orange with black apical area ... *aurantiaca* 247

Fore wing above white with large black apical area *belisama* 244

Fore wing above white with apical area dusted with white ... ... *descombesi* 237

Hind wing below with black submarginal spots ... *splendida* 242

45. Hind wing below with red submarginal spots ... 47

Hind wing below with reddish-brown or brown submarginal spots or patches and black ground-colour 46

46. Hind wing below with submarginal brown patches close together ... ... *nais* 113

Hind wing below with small free submarginal spots *bornemanni* 111

Hind wing below with brownish submarginal spots forming a band and a white subbasal streak in 7 *callima* 129

47. Hind wing below with black distal area and red cell-patch ... ... *cenaeus* 373

Hind wing below without a red cell-patch ... 48

48. Hind wing below with the outer edge of submarginal spot in 3 nearer to the cell than to the margin 49

Hind wing below with the outer edge of submarginal spot in 3 nearer to the margin than to the cell 50

49. Fore wing above with yellow apical area ... *bagoe* 394

Fore wing above with white subapical band ... *salvini* 393

50. Hind wing below with white discal patch and yellow cell-spot ... ... *aganippe* 272

Hind wing below with red and white discocellular spot and no cell-spot ... ... *argenthona* 400

Hind wing below without discal spot or patch ... 51

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51. Fore wing above with a black apical area and subapical white spots 52
Fore wing above with a black apical area and no subapical white spots 58
Fore wing above with the apical area slightly or heavily dusted with black, some at least of the white ground-colour showing through. No distinct subapical spots 59
Fore wing above with black distal margin in which is placed a series of large white spots ... *eucharis* 329
52. Hind wing below with black distal margin extending to the costa in cellule 7 53
Hind wing below with the black distal margin not reaching the costa, and no red submarginal spot in 6 unless also one above in 7 ... ... *mysis* 380
Hind wing below with a red submarginal spot in 6 lying mostly in the white area ... ... *euphemia* 392
53. Hind wing below with the black margin broken up by white ... ... *periboea* 362
Hind wing below with the black margin entire ... 54
54. Hind wing below with yellow marginal spots bearing the red spots ... ... *fasciata* 367
Hind wing below without marginal spots ... 55
55. Hind wing below with deep black distal area sharply differentiated from a yellow basal area... *timorensis* 375
Hind wing below with the distal area not sharply differentiated from the proximal area... ... 56
56. Hind wing below with a yellow discal band and rounded submarginal spots ... ... *sagessa* 67
Hind wing below with posterior submarginal spots somewhat oblong ... ... *poecilea* 371
Hind wing below with posterior submarginal spots longer than broad 57
57. Hind wing below with orange-yellow proximal area and black basal dusting ... ... *sambawana* 369
Hind wing below with lemon-yellow proximal area ... ... *schoenbergi* 397
58. Hind wing below with a subbasal red stripe ... *eumolpe* 258
59. Fore wing above with a black subapical band which has distal prolongations on the veins, the apical area being more or less dusted with black ... 60
Fore wing above without a black subapical band *hyparete* 346
60. Hind wing below with an orange-yellow anal patch not extending above vein 2 ... ... *mitisi* 361
Hind wing below with extended orange or yellow median area ... ... *rosenbergi* 387

B. Hind wing below with cell-stripe proximally white and distally yellow 1
Hind wing below with cell-stripe yellow ... *belladonna* 166

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1. Hind wing above with anal area yellow and extended as a large patch in cellule 2 ... *wilemani* 158
   Hind wing above with anal area yellow and not extending into cellule 2 2
   Hind wing above with anal area not yellow ... *berinda berinda* 163
2. Hind wing above without a yellow basal costal patch (or only a trace) ... ... *patrua* 155
   Hind wing above with a yellow basal costal patch 3
3. Hind wing above with a sharply defined white cell-stripe ... ... *lativitta* 156
   Hind wing above without a sharply-defined white cell-stripe 4
4. Hind wing above with the discal spot in cellule 4 truncate or emarginate proximally 5
   Hind wing above with discal spots in cellule 4 narrow and proximally extended 6
5. Hind wing above with large white markings ... *sanaca sanaca* 159
   Hind wing above with short and narrow stripes... *sanaca perspicua* 161
6. Hind wing above very dark, stripes short and linear, not diffuse ... ... *adelma* 162
   Hind wing above with diffuse stripes 7
7. Species from China and Yunnan. Uncus narrow, side lobes very short ... ... *subnubila* 157
   Species from Sikkim. Uncus broad, with side lobes prominent ... ... *berinda boyleae* 164

C. Hind wing below without submarginal spots.
   Hind wing below with marginal spots... ... 1
   Hind wing below without marginal spots ... 3

1. Hind wing below with a yellow discal band and small yellow marginal spots ... ... *schmassmanni* 60
   Hind wing below without a discal band; marginal spots long with rounded inner edge ... ... *eileenae* 286
   Hind wing below with medium and somewhat square or oblong marginal spots 2
2. Hind wing below yellow, without a submarginal white line ... ... *rothschildi* 288
   Hind wing below yellow, with a submarginal white line ... ... *apatela* 285
   Hind wing below pale yellow, heavily dusted with black ... ... *subviridis* 282
   Hind wing below with the three anterior spots much larger than the others ... ... *dumasi* 22
3. Both wings above orange with black apical area 19
   Wings above not orange 4
4. Hind wing below with a subbasal orange spot in 7 5
   Hind wing below without a subbasal orange spot in 7 7
   Hind wing below with a red subbasal band ... 20
5. Hind wing below with a rounded yellow disco-cellular spot, sometimes reduced to a dot ... *mariae* 226

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	Hind wing below without a yellow discocellular spot	6
6.	Hind wing below with the veins grey-white ...	*clathrata* 221
	Hind wing below with the veins of the ground-colour, and a black discocellular spot... ...	*catocausta* 223
7.	Hind wing below with a black discal spot or patch	8
	Hind wing below without a black discal spot or patch	11
8.	Hind wing below with a yellow basal patch in 7	*pratti* 107
	Hind wing below with a red basal patch in 7 ...	*castaneus* 106
	Hind wing below with a subbasal stripe in 7 ...	9
9.	Hind wing below with the subbasal stripe white	10
	Hind wing below with the subbasal stripe yellow and with orange discal area...	*albertisi* 215
	Hind wing below with the subbasal stripe yellow and with a yellowish-white distal band ...	*elongatus* 220
	Hind wing below with the subbasal stripe yellow, and a yellow posterior discal patch	*mira* 224
10.	Hind wing below with a large orange or yellow area	*discus* 217
11.	Hind wing below with a red subbasal spot or stripe in 7	12
	Hind wing below without a red subbasal spot or stripe in 7	14
12.	Fore wing below with the cell red	*eximia* 149
	Fore wing below with the cell not red	13
13.	Fore wing above white, apex narrowly dark brown	*dohertyi* 146
	Fore wing above white, and narrow black apical area; hind wing below with yellow curved discal band	*ellipsis* 271
	Fore wing above white with black apical area ...	*persephone* 143
	Fore wing above black with a small white area at the base	*inexpectata* 222
14.	Hind wing below with a white subbasal stripe in 7	15
	Hind wing below without a white subbasal stripe in 7	16
15.	Hind wing below with a white or yellowish apical costal patch	*mecki* 229
	Hind wing below without a white or yellowish apical costal patch	*nicpelti* 233
16.	Hind wing below mostly yellow	*omissa* 305
	Hind wing below mostly black	17
	Hind wing below maroon, with the veins white...	*klossi* 228
17.	Hind wing above with yellow proximal area ...	*totila* 59
	Hind wing above with white proximal area ...	*nurses* 292
	Hind wing above white	18
	Hind wing above grey-black; below with outwardly suffused distal yellow stripes	*benasu* 174
18.	Hind wing below with costal edge white, yellow at the base without black dusting	*eudiabolus* 69

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	Hind wing below with costal edge of the ground-colour, its base dusted with yellow	*ladas* 55
	Hind wing below with costal edge of the ground-colour, its basal third yellow and proximal area of wing dusted with yellow	*caliban* 57
	Hind wing below without yellow scaling at base of costa	*viridomara* 56
19.	Hind wing below black	*irma*, *arovana*, *inferna*, 265, 267, 266
	Hind wing below red discal area or band ...	*aruna* (other races) 262
20.	Hind wing above with a red basal patch ...	24
	Hind wing above without a red basal patch ...	21
21.	Hind wing above with a white discocellular mark	22
	Hind wing above without a white discocellular mark	23
22.	Hind wing above without a yellow stripe in cellule 2...	*aglaia* 193
	Hind wing above with a yellow stripe in cellule 2	*pandemia* 182
23.	Hind wing above with a yellow stripe in cellule 2	*henningia* 175
	Hind wing above with a broad yellow stripe in the cell	*ottonia* 181
	Hind wing above without a yellow stripe in cellule 2...	*crithoe* 185
24.	Hind wing above with red basal patch extended well below the cell	*thysbe* 208
	Hind wing above with a red basal patch not extended below the cell or only slightly so ...	*ninus* 212
Section II.	Hind wing below with a red postdiscal or submarginal line.[1]	
	Hind wing below with a submarginal line ...	*A*
	Hind wing below with a red postdiscal line ...	*B*
A.	A red subbasal stripe or spot in 7, and no free red stripe or spot below the cell	1
	A red subbasal stripe or spot in 7 and a free stripe or spot below the cell	7
	No red subbasal stripe or spot	10
1.	Hind wing below with red discal suffusion ...	*duris* 150
	Hind wing below without red discal suffusion ...	2
2.	Fore wing below white with black apical area ...	3
	Fore wing below black	6
3.	Hind wing below mostly black	4
	Hind wing below mostly white or yellow ...	5
4.	Hind wing below with submarginal line strongly waved and near the margin...	*funerea* 151
	Hind wing below with submarginal line not waved, rather narrow, and not near the margin ...	*ornytion* 144
5.	Hind wing below with a yellow submedian stripe	*mesoblema* 118

[1] In *hapalina* this line is sometimes vestigial or absent.

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Hind wing below without a yellow submedian stripe, and with pale yellow distal costal area ... *dixeyi* 140
Hind wing below with a red discocellular spot ... *wollastoni* 154
6. Hind wing below with submarginal line narrow and near the margin ... ... *caroli* 108
7. Hind wing below with a red spot below the cell... 8
Hind wing below with a red stripe below the cell and subbasal spot edged with white anteriorly ... *marguerita* 130
8. Hind wing below with a buff-coloured anterior patch reaching the costa ... ... *alepa* 138
Hind wing below with a pale buff rounded discal patch ; fore wing below with orange proximal area *weiskei* 126
Hind wing below with white anterior area and a black posterior area 9
9. Hind wing below with the white area prolonged posteriorly along the distal edge of the submarginal line ... ... *isocharis* 136
Hind wing below with the white area not extended below vein 3 ... ... *ligata* 133
10. Hind wing below without marginal spots ... 11
Hind wing below with marginal spots 12
11. Hind wing below with subbasal stripe white and a short red bar below cell ... ... *phippsi* 125
Hind wing below with subbasal stripe yellow and edged with white anteriorly ... ... *bakeri* 119
Hind wing below with subbasal stripe yellowish-white or white ... ... *bothwelli* 141
12. Hind wing below with the marginal spots white... *iltis* 116
Hind wing below with the marginal spots yellow *callista* 120

B. Hind wing below with a red subbasal stripe or spot in 7 1
Hind wing below without a red subbasal stripe or spot in 7 3
1. Hind wing below with blackish-brown marginal patches ; postdiscal line broad ... ... *harpalyce* 273
Hind wing below without marginal patches ... 2
2. Hind wing below with a yellow distal border separated from the red postdiscal line ... *joiceyi* 142
Hind wing below with a yellow distal border reaching the red postdiscal line ... ... *prouti* 148
Hind wing below without a yellow distal border... *nigrina* 153
3. Hind wing below with a yellow or yellowish-white subbasal stripe in 7 4
4. Hind wing below white with a black postdiscal band ; red line sometimes absent ... ... *hapalina* 121
Hind wing below black with a white apical patch *campbelli* 124

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3.—Key to Females.

(The number following the species indicates the order of its arrangement in the monograph.)

Section I. Hind wing below without a red postdiscal or submarginal line, or with red submarginal spots.

Section II. Hind wing below with a red postdiscal or submarginal line and no red submarginal spots.

Section I. Hind wing below with submarginal spots or patches either separated or forming a band ... *A*
Hind wing below with a large yellow basal spot in 8 and a larger one in 7 ... ... *B*
Hind wing below without submarginal spots ... *C*

A. Hind wing below with submarginal spots, not red except in the case of submarginal dots[1] ... 1
Hind wing below with submarginal spots or patches, brown, red, or reddish brown ... 47

1. Hind wing below without a subbasal or subcostal red stripe 2
Hind wing below with a subbasal subcostal red stripe or spot 43

2. Hind wing below with costa, at least at its base, differently coloured to the basal or discal area of wing. Species mostly without yellow ground-colour 3
Hind wing below with costa, at least for its basal third of same colour as basal area of wing. Species mostly with yellow ground-colour ... 29

3. Hind wing below with a yellow and white or white discal band, either entire or of spots ... 4
Hind wing below without a yellow or white discal band 17
Hind wing below with a discal line or rudimentary discal band 15

4. Hind wing below with a yellow, orange, or white cell-spot or stripe 5
Hind wing without a cell-spot 13

5. Hind wing below with a yellow cell-spot ... 6
Hind wing below with a cell-stripe 11

6. Hind wing below without a yellow or orange subcostal stripe in 7 7
Hind wing below with a yellow or orange subcostal stripe in 7 ... ... *geraldina* 68

[1] Vestiges only in *leeerfi*. In *simanubum* the submarginal spots are replaced by patches which are not distinctly separated from the yellow proximal area. In *maudei* the two anterior spots are on the margin.

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7.	Fore wing above with black distal and white proximal area	8
	Fore wing above black-brown with or without a discal band	9
8.	Hind wing below with yellow submarginal dots and the discal band toothed on the veins ...	*cuninggati* 89
	Hind wing below with yellow submarginal dots and discal band not toothed	*flavopicta f. albifascia* 74
	Hind wing below with yellow submarginal spots, and fore wing below with white area not reaching upper margin of cell or is proximally reduced ...	*pheres* 90
	Hind wing below with yellow submarginal spots, and fore wing below with extended white area...	*aroae* 97
	Hind wing below with red submarginal dots ...	*microsticha f. albifascia* 71
9.	Fore wing above without a distinct discal band ...	*fuliginosus* 98
	Fore wing above with distinct discal band ...	10
10.	Fore wing above with discal band ochraceous dusted with black	*fuliginosus f. ochraceus* 99
	Fore wing above with discal band yellow and not dusted with black	*imitator* 76
11.	Hind wing below with an orange submedian line	12
	Hind wing below with a sulphur-yellow submedian line	*eichhorni* 100
12.	Fore wing below with large submarginal spots below vein 4	*leucobalia* 103
	Fore wing below without or with indistinct submarginal spots below vein 4	*catisa* 105
13.	Hind wing below with a discal band of spots ...	*momea* 30
	Hind wing below with discal band entire ...	14
14.	Hind wing below with discal band yellow and with basal yellow dusting	*stresemanni forms* 63, 64, 65
	Hind wing below with discal band white ...	*fruhstorferi* 31
15.	Hind wing below with a white discocellular spot	*stresemanni forms* 61, 62
	Hind wing below with a yellow or orange cell-dot	16
	Hind wing below without a cell-dot and costa yellow at the base	*huphinoides* 29
16.	Hind wing below with a yellow basal spot ...	*flavopicta* 73
	Hind wing below with a red basal spot ...	*microsticha* 70
17.	Hind wing below with a cell-spot	18
	Hind wing below without a cell-spot	20
18.	Hind wing below with cell-spot yellow and submarginal dots vestigial	*lecerfi* 66
	Hind wing below with the cell-spot red ...	19
19.	Hind wing below with internervular red stripes...	*rubrostriata* 78

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	Hind wing below with a red subcostal spot in 7...	*thompsoni* 85
20.	Hind wing below with a discocellular mark or discal patch	21
	Hind wing below without a discocellular mark or discal patch	25
21.	Hind below with yellowish or white discocellular streak	22
	Hind wing below with a discal patch	23
22.	Hind wing below with the submarginal spots wedge-shaped	*chrysomelaena* 50
	Hind wing below with the submarginal spots not wedged-shaped	*manuselensis* 25
23.	Hind wing below with a large rounded yellow or white discal patch	*georgina* 14
	Hind wing below with a black discal patch ...	24
24.	Hind wing below with the discal patch rounded and sharply defined on a grey-black ground ...	*heroni* 81
	Hind wing below as in *heroni* but with a white ground	*albo-oculatus* 82
	Hind wing below with the discal patch diffused ...	*hypomelas* 77
25.	Hind wing below dark brown and with submarginal spots orange	*nysa* 32
	Hind wing below mostly white and with orange submarginal spots...	*ennia* 317
	Hind wing below dark brown with white costal area, submarginal spots orange	*nigidius* 324
	Hind wing below with submarginal spots not orange	26
26.	Hind wing below with submarginal spots white...	27
	Hind wing below with submarginal spots yellow...	28
27.	Fore wing above black with white submarginal spots	*talboti* 52
	Fore wing above black with yellow basal area and yellow subapical band	*itamputi* 83
28.	Hind wing above with black distal margin regularly curved, and with white proximal area...	*vidua* 23
	Hind wing above with black distal margin regularly curved and with yellow proximal area ...	*caliban* 57
	Hind wing above with black distal margin not regularly curved	*eschatia* 24
29.	Hind wing below mostly yellow with black or dark brown marginal band	30
	Hind wing below yellow in the basal area and white or dark brown in the distal area ...	39
30.	Hind wing below with veins black	31
	Hind wing below with some of the veins white or grey-white	32
	Hind wing below with most of the veins of the ground-colour	35

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31. Hind wing below with the veins heavily black and dark distal border not reaching the costa ... *baracasa* 278
Hind wing below with the dark distal border reaching the costa; submarginal spots white and of medium size ... ... *blanca* 18
Hind wing below with dark distal border reaching the costa; submarginal spots yellow and large *singhapura* 2
Hind wing below with dark distal border reaching the costa; submarginal yellow stripes scarcely separated from the proximal area ... ... *simanubum* 12
32. Fore wing above black-brown ... ... *dorimene* 284
Fore wing above mostly white 33
33. Fore wing above with a black-brown discocellular costal bar merged with the dark distal margin ... *dice* 44
Fore wing above with a black-brown discocellular costal bar not merged with dark distal margin ... *enniana* 37
Fore wing above without a black-brown costal bar 34
34. Hind wing below with small submarginal spots ... *gabia* 293
Hind wing below with submarginal spots large and elongate ... ... *themis* 5
35. Fore wing below mostly black-brown 36
Fore wing below mostly white or with proximal area white or yellowish and distal area black-brown 37
Fore wing below mostly yellow ... ... *waterstradti* 27
36. Hind wing below orange-yellow with narrow distal border ... ... *agostina* 274
Hind wing below orange-yellow with broad distal border ... ... *melusina* 277
Hind wing below pale yellow and with broad distal border ... ... *kuchni* 8
Hind wing below greenish-yellow and with large submarginal wedge-shaped spots ... ... *echidna* 287
37. Hind wing below with orange submarginal spots 38
Hind wing below with yellow submarginal spots *dorylaea* 283
Hind wing below with white submarginal spots *agoranis* 1
38. Hind wing below with distal border reaching the costa ... ... *alberti* 307
Hind wing below with distal border not reaching costa; anal area with orange suffusion ... *multicolor* 326
Hind wing below with distal border not reaching the costa; anal area without orange suffusion. Fore wing below with the two anterior apical spots yellow ... ... *sacha* 310
39. Hind wing below with white submarginal spots ... *lytaea* 327
Hind wing below with yellow or orange submarginal spots 40
40. Fore wing above black-brown and hind wing with submarginal spots 41

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Hind wing above without submarginal spots ... 42

41. Hind wing above with white submarginal spots, below with orange submarginal spots, mostly wedge-shaped ... ... *candida* 312

Hind wing above with yellowish diffuse submarginal spots, the anterior spot not larger than the others; below with bright yellow submarginal spots ... ... *maudei* 35

Hind wing above with yellowish submarginal spots, the two anterior ones larger than the others ... *ribbei* 34

Hind wing above with yellowish submarginal spots, below with the two anterior submarginal spots orange-yellow and the others yellowish-white ... *biaka* 290

Hind wing above with white submarginal spots, below with submarginal spots not wedge-shaped *bosnikiana* 315

42. Hind wing below with yellow proximal area and dark brown distal area ... ... *isse* 308

43. Hind wing below with a subbasal red spot ... *diaphana* 270

Hind wing below with a subbasal red stripe ... 44

44. Fore wing above with veins, at least in the discal area, striped with white ... ... *descombesi* 237

Fore wing above with the veins not striped with white 45

45. Fore wing above with a white discocellular patch *zebuda* 256

Fore wing above with a yellow discocellular patch *madetes* 259

Fore wing above with a discocellular spot or streak 46

46. Fore wing above with yellow or orange basal dusting *belisama* 244

47. Hind wing below with red submarginal spots ... 49

Hind wing below with the submarginal spots or patches reddish-brown or brown, and the ground-colour black 48

48. Hind wing below with submarginal brown patches placed together ... ... *nais* 113

Hind wing below with small free submarginal spots ... ... *bornemanni* 111

Hind wing below with reddish-brown submarginal spots forming a band, and with a white subbasal streak in ♂ ... ... *callima* 129

49. Hind wing below with a red cell-patch ... *caeneus* 373

Hind wing below without a red cell-patch ... 50

50. Hind wing below with a discocellular patch ... 51

Hind wing below without a discocellular patch ... 52

51. Hind wing below with a red basal spot and a white discocellular patch ... ... *aganippe* 272

Hind wing below without a red basal spot and with a red discocellullar patch ... ... *argenthona* 400

52. Fore wing above mostly black-brown with yellow subapical spots 53

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Fore wing above mostly black-brown and with white subapical spots; hind wing with a submarginal band ... ... *schoenbergi* 397

Fore wing above mostly black-brown and with white subapical spots; hind wing without submarginal band ... ... *salvini* 393

Fore wing above mostly black-brown and with a white discal band 55

Fore wing above mostly black-brown with a large white discocellular spot ... ... *eumolpe* 258

Fore wing above mostly black-brown with a large yellow subapical patch ... ... *bagoe* 394

Fore wing above dusky-white with the veins black-brown or white 56

Fore wing above with white proximal area and black distal area 60

53. Hind wing below with red submarginal band extending into cellule 7 ... ... *poecilca* 371

Hind wing below with red submarginal band not extending to cellule 7 54

54. Fore wing below with a white discocellular dot... *aruensis* 383

Fore wing below without a discocellular dot ... *euphemia* 392

55. Hind wing below with the discal band white ... *mitisi* 361

Hind wing below with the discal band mostly yellow ... ... *rosenbergi* 357

56. Fore wing above with the veins white... ... *sambawana* 369

Fore wing above with the veins black-brown ... 57

57. Hind wing below with the veins black ... 58

Hind wing below with the veins of the ground-colour 59

58. Fore wing above with white stripes interrupted by a narrow submarginal band of ground-colour... *eucharis* 329

Fore wing above without a submarginal band ... *hyparete* 346

59. Fore wing above with large yellow subapical spots *fasciata* 367

Fore wing above with medium-sized white or yellowish subapical spots ... ... *periboea* 362

60. Hind wing below with a red submarginal spot in 7 61

Hind wing below without a red submarginal spot in 7 62

61. Fore wing below with yellow basal area and black distal area ... ... *timorensis* 375

Fore wing below with white proximal area and black distal area ... ... *mysis* 380

62. Both wings below with a yellow discal band ... *sagessa* 67

B. Hind wind below with cell-stripe proximally white and distally yellow 1

Hind wing below with cell-stripe yellow ... *belladonna* 166

1. Hind wing above with a yellow distal stripe in cellule 2 ... ... *wilemani* 158

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Hind wing above without a distal stripe in cellule 1c ... ... *berinda berinda* 163
Hind wing above with a white or yellow stripe in cellule 1c 2

2. Hind wing above without a yellow basal patch or with only a trace of one ... ... *patrua* 155
Hind wing above with a yellow basal costal patch 3

3. Both wings with the fringes white for the greater part ... ... *lativitta* 156
Both wings with the fringes black for the greater part 4

4. Hind wing above with marginal spots ... ... *sanaca sanaca* 159
Hind wing above with submarginal spots ... 5

5. Hind wing above with the postdiscal spots in cellules 3 and 4 short and somewhat square ... *sanaca perspicua* 161
Hind wing above with postdiscal stripes in cellules 3 and 4 6

6. Hind wing above with yellow suffusion in cellule 1c ... ... *subnubila* 157
Hind wing above with white suffusion in cellule 1c *berinda adelma* 162

C'. Hind wing below without submarginal spots.
Hind wing below with marginal spots ... 1
Hind wing below without marginal spots ... 5

1. Hind wing below with a yellow discal band and small yellow marginal spots ... ... *schmassmanni* 60
Hind wing below without a discal band ... 2

2. Hind wing below greenish-yellow, owing to being heavily dusted with black ... ... *subviridis* 282
Hind wing below lemon-yellow 3

3. Hind wing below with the posterior marginal spots smaller and not touching the margin ... *dumasi* 22
Hind wing below with all the marginal spots touching the margin 4

4. Hind wing below with a white submarginal line *apatela* 285
Hind wing below without a white submarginal line and with anal orange suffusion ... ... *rothschildi* 288
Hind wing below with a red subbasal band ... 22

5. Fore wing above with orange-yellow proximal area and no discocellular spot 6
Fore wing above with a large discocellular spot... 7
Fore wing above with grey, white or bluish proximal area 8
Fore wing above black with white submarginal spots ... ... *elongatus* 220
Fore wing above black without white submarginal spots ... ... *pratti* 107
Fore wing above black with or without submarginal dots; hind wing below with large orange-yellow area ... ... *albertisi* 215

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6. Hind wing below with a white or yellowish apical-costal patch ... ... *mecki* 229
   Hind wing below without a white or yellowish apical-costal patch ... ... *niepelti* 233
7. Fore wing above with white discocellular spot ... *aruna* (other races 262
   Fore wing above with orange discocellular spot... *irma, arorana, inferna*, 265, 267, 266
8. Hind wing below with a subbasal orange spot in 7 9
   Hind wing below without a subbasal orange spot in 7 11
9. Hind wing below with a rounded yellow discocellular spot sometimes reduced to a dot ... *mariae* 226
   Hind wing below without a yellow discocellular spot 10
10. Hind wing below with the veins grey-white ... *clathrata* 221
    Hind wing below with the veins of the ground-colour and a black discocellular spot ... ... *catocausta* 223
11. Hind wing below with a black discal spot or patch 12
    Hind wing below without a distinct discal spot or patch 15
12. Hind wing below with a red basal patch in 7 ... *castaneus* 106
    Hind wing below with a subbasal stripe in 7 ... 13
13. Hind wing below with the subbasal stripe white 14
14. Hind wing below with a large orange or yellow area ... ... *discus* 217
15. Hind wing below with a red subbasal spot or stripe in 7 16
    Hind wing below without a red subbasal spot or stripe in 7 18
16. Hind wing below with a curved yellow discal band *ellipsis* 271
    Hind wing below black without a discal band ... 17
    Hind wing below pale olive-green with slight black dusting ... ... *levicki* 255
17. Both wings above mostly black-brown, more grey proximally on the fore wing ... ... *dohertyi* 146
    Fore wing above with white proximal area and black distal area ... ... *persephone* 143
18. Hind wing below mostly yellow ... ... *omissa* 305
    Hind wing below mostly black 19
19. Abdomen below yellow 20
    Abdomen below white 21
20. Fore wing above with proximal area blue-grey ... *totila* 59
    Fore wing above with proximal area white ... *ladas* 55
21. Hind wing below with yellow basal area ... *narses* 292
    Hind wing below with a yellow basal costal spot *eudiabolus* 69
22. Hind wing above with a red basal stripe in 7 ... 25
    Hind wing above without a red basal stripe in 7 23
23. Hind wing below with the distal stripe in 7 placed above the one below it ... ... *crithoe* 185

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	Hind wing below with the distal stripe in 7 placed beyond the one below it	24
24.	Hind wing above with a discal band (sometimes vestigial) and no separate anal patch... ...	*aglaia* 193
	Hind wing above without a discal band, but with large anal patch reaching beyond vein 3 ...	*henningia* 175
	Hind wing above without a discal band and anal patch not reaching beyond vein 3	*ottonia* 181
25.	Hind wing above with distal yellow stripes ...	26
	Hind wing above with a yellowish-white discal band	*parthenia* 213
26.	Hind wing above with the distal stripes in 5 and 6 yellow	*ninus* 212
	Hind wing above with the distal stripes in 5 and 6 not yellow	*thysbe* 208
Section II.	Hind wing below with a red postdiscal or submarginal line,[1] and no red submarginal spots.	
	Hind wing below with a submarginal line ...	*A*
	Hind wing below with a red postdiscal line ...	*B*
A.	A red subbasal stripe or spot in 7 and no free red stripe or spot below the cell	1
	A red subbasal stripe or spot in 7 and a free red stripe or spot below the cell	7
	No red subbasal stripe or spot	10
1.	Hind wing below with red discal suffusion ...	*duris* 150
	Hind wing below without red discal suffusion ...	2
2.	Fore wing below white with black apical area ...	3
	Fore wing below black	6
3.	Hind wing below mostly black	4
	Hind wing below mostly white or yellow ...	5
4.	Hind wing below with submarginal line strongly waved and near the margin...	*funerea* 151
	Hind wing below with submarginal line not waved, rather thin, and not near the margin ...	*ornytion* 144
5.	Hind wing below with a yellow submedian stripe	*mesoblema* 118
	Hind wing below without a yellow submedian stripe, and with pale yellow discal costal area ...	*dixeyi* 140
	Hind wing below with a red discocellular spot ...	*wollastoni* 154
6.	Hind wing below with the submarginal line narrow and near the margin	*caroli* 108
7.	Hind wing below with a red spot below the cell	8
	Hind wing below with a red stripe below the cell and subbasal spot edged with white anteriorly...	*margueritа* 130
8.	Hind wing below with a buff-coloured anterior patch reaching the costa	*alepa* 138
	Hind wing below with a pale buff rounded discal patch; fore wing below with orange proximal area	*weiskei* 126
	Hind wing below with white anterior area and a black posterior area	9

[1] In *hapalina* this line is sometimes vestigial or absent.

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9.	Hind wing below with the white area prolonged posteriorly along the distal edge of the submarginal line	*isocharis* 136
	Hind wing below with the white area not extended below vein 3	*ligata* 133
10.	Hind wing below with marginal spots	*iltis* 116
	Hind wing below without marginal spots or with only vestiges	11
11.	Hind wing below with the subbasal stripe white	12
	Hind wing below with the subbasal stripe yellow or partly white	13
12.	Hind wing below with a short red bar below the cell	*phippsi* 125
	Hind wing below with submarginal line not reaching costa	*bothwelli* 141
13.	Hind wing below with the discal patch edged proximally with red	*callista* 120
	Hind wing below with the discal patch not edged proximally with red	14
14.	Hind wing below with the subbasal yellow and white stripe placed parallel to the costa ...	*bakeri* 119
	Hind wing below with the subbasal yellow and white stripe placed oblique to the costa ...	*conspectirubra* 122
B.	Hind wing below with a red subbasal spot in 7, somewhat square in shape	*harpalyce* 273
	Hind wing below with a red subbasal stripe in 7	1
	Hind wing below with a yellow subbasal stripe in 7	2
1.	Fore wing above with a red submarginal band ...	*joiceyi* 142
	Fore wing above with pale yellow subapical spots	*prouti* 148
	Fore wing above with white subapical spots ...	*nigrina* 153
2.	Hind wing below white with black markings ...	*hapalina* 121
	Hind wing below black with a white apical patch	*campbelli* 124

4.—List of Delias in the Order of their Classification.

Genus *Delias*.

Group I (*singhapura* group).

1. *agoranis* Sm. (1887, Burma.)
2. *singhapura singhapura* Wall. (1867, Singapore.)
3. „ *acuta* Roths. (1915, S.E. Sumatra.)
4. „ *indistincta* Fruh. (1897, Borneo.)
5. *themis themis* Hew. (1861, Philippines.)
6. „ *soteira* Fruh. (1910, Luzon.)
7. *kuehni prinsi* Mart. (1912, C. Celebes.)
8. „ *kuehni* Honr. (1886, Bankai.)
9. „ *sulana* Stgr. (1894, Sula Mangoli.)

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GROUP II (*nysa* group).

10. *georgina orphne* Wall. (1867, Malacca.)
11. „ *tahanica* Roths. (1925, Malay Pen.)
12. „ *simanubum* Hag. (1894, Sumatra.)
13. „ *cinerascens* Mitis. (1893, N. Borneo.)
14. „ *georgina* Feld. (1861, Luzon.)
15. „ *battana* Fruh. (1896, S. Celebes.)
16. „ „ f. *defasciata* Niep. (1920, S. Celebes.)
17. „ „ ♀ f. *auricoma* Fruh. (1911.)
18. *blanca blanca* Feld. (1862, N. Luzon.)
19. „ *apameia* Fruh. (1911, Mindanao.)
20. „ *nausicaa* Fruh. (1899, N. Borneo.)
21. *schuppi* Talb. (1928, Ceram.)
22. *dumasi* Roths. (1925, Buru.)
23. *vidua* J. & T. (1922, Buru.)
24. *eschatia* J. & T. (1923, Buru.)
25. *manuselensis manuselensis* J. & T. (1920, C. Ceram.)
26. „ *brooksi* J. & T. (1925, Amboina.)
27. *waterstradti* Roths. (1915, Halmaheira.)
28. *momea hageni* Rogenh. (1892, Sumatra.)
29. „ *huphinoides* J. & T. (1925, S.W. Sumatra.)
30. „ *momea* Bdv. (1836, Java.)
31. *fruhstorferi* Honr. (1891, E. Java.)
32. *nysa nysa* Fbr. (1775, Australia.)
33. „ *nivira* Waterh. & Lyell. (1914, N. Queensland.)
34. *ribbei* Röb. (1886, Aru.)
35. *maudei* Joic. & Noakes. (1915, Biak.)
36. *enniana obsoleta* Roths. (1915, Mysol.)
37. „ *enniana* Ob. (1880, N.E. Dutch New Guinea.)
38. „ *majoripuncta* J. & T. (1922, Mefor.)
39. „ *kapaura* Roths. (1915, Kapaur, S.W. Dutch New Guinea.)
40. „ *reducta* Roths. (1915, Eilanden River, S. Dutch New Guinea.)
41. *dice mitisana* Strand. (1916, Waigeu) vice *dorothea* Mitis, 1893 parte.)
42. „ „ ♀ f. *latoclavata* Van Eecke. (1924, N.E. Dutch New Guinea.)
43. „ „ ♀ f. *leucana* Stnd. (1916.)
44. „ *dice* Voll. (1865, S.W. Dutch New Guinea.)

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45. *dice latimarginata* J. & T. (1925, S. Geelvink Bay, N. Dutch New Guinea.)
46. ,, *fulvoflava* Roths. (1915, Utakwa River, S. Dutch New Guinea.)
47. ,, *ecceicei* J. & T. (1916, S.W. Brit. New Guinea.)
48. ,, *samarai* J. & T. (1916, S.E. Brit. New Guinea.)
49. ,, *rectifascia* Talb. (1928, Rossell Isd.)

GROUP III (*chrysomelaena* group).

50. *chrysomelaena chrysomelaena* Voll. (1866, Batjan.)
51. ,, *prodigialis* Fruh. (1911, Halmaheira.)
52. *talboti* Joic. & Noakes. (1915, Biak.)
53. *ladas waigeuensis* J. & T. (1917, Waigeu.)
54. ,, *levis* J. & T. (1922, Weyland Mtns., N. Dutch New Guinea.)
55. ,, *ladas* Sm. (1894, N.E. Brit. New Guinea.)
56. *viridomara* Fruh. (1911, N.E. Brit. New Guinea.)
57. *caliban caliban* Sm. (1897, Fergusson Isd.)
58. ,, *satisbona* Roths. (1915, Goodenough Isd.)
59. *totila* Heller. (1896, New Britain.)

GROUP IV (*stresemanni* group).

60. *schmassmanni* J. & T. (1923, Buru.)
61. *stresemanni* Roths. (1915, Ceram.)
62. ,, f. *oenus* Talb. (1920, Ceram.)
63. ,, ♀ f. *mediofasciata* Talb. (1920, Ceram.)
64. ,, ♀ f. *lutea* Talb. (1920, Ceram.)
65. ,, ♀ f. *basiflava* Talb. (1920, Ceram.)
66. *lecerfi* J. & T. (1922, Weyland Mtns., N. Dutch New Guinea.)

GROUP V (*geraldina* group.)

67. *sagessa* Fruh. (1910, S.W. Brit. New Guinea (vice *dives* Roths. praeocc. 1904.)
68. *geraldina geraldina* Sm. (1894, N.E. Brit. New Guinea.)
69. *eudiabolus* Roths. (1915, S.W. Brit. New Guinea.)
70. *microsticha* R. & J. (1904, S.W. Brit. New Guinea.)
71. ,, ♀ f. *albifascia* Talb. (1928, Weyland Mtns., N. Dutch New Guinea.)
72. ,, *terranea* Talb. (1928, Rawlinson Mtns., N.E. Brit. New Guinea.)

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73. *flavopicta* Jord. (1911, Arfak Mtns., N.E. Dutch New Guinea) (vice *rothschildi* Kenr. praeocc. 1909.)
74. ,, ♀ f. *albifascia* Talb. (1928, Arfak Mtns., N.E. Dutch New Guinea.)
75. *rileyi* J. & T. (1922, Weyland Mtns., N. Dutch New Guinea.)
76. *imitator* Kenr. (1911, Arfak Mtns., N.E. Dutch New Guinea.)
77. *hypomelas hypomelas* R. & J. (1907, Mambare Riv., N. Brit. New Guinea.)
78. ,, *rubrostriata* J. & T. (1922, Weyland Mtns., N. Dutch New Guinea.)
79. ,, *conversa* Jord. (1911, Mt. Goliath, S. Dutch New Guinea.)
80. ,, *rawlinsoni* Talb. (1928, Rawlinson Mtns., N.E. Brit. New Guinea.)
81. *heroni heroni* Kenr. (1909, Arfak Mtns., N.E. Dutch New Guinea.)
82. ,, ,, f. *albo-oculatus* Joic. & Noakes. (1915, Arfak Mtns., N.E. Dutch New Guinea.)
83. *itamputi* Ribbe. (1900, Aroa Riv., S.W. Brit. New Guinea.)
84. *nigropunctata* Joic. & Noakes. (1915, Arfak Mtns., N.E. Dutch New Guinea.)
85. *thompsoni* J. & T. (1916, Wandammen Mtns., N.E. Dutch New Guinea.)
86. *citrona* J. & T. (1922, Weyland Mtns., N. Dutch New Guinea.)
87. *cuningputi jordani* Kenr. (1909, Arfak Mtns., N.E. Dutch New Guinea.)
88. ,, *fascelis* Jord. (1911, Mt. Goliath, S. Dutch New Guinea.)
89. ,, *cuningputi* Ribbe. (1900, Aroa Riv., S.W. Brit. New Guinea.)
90. *pheres pheres* Jord. (1911, Mt. Goliath, S. Dutch New Guinea.)
91. ,, *approximata* J. & T. (1922, Weyland Mtns., N. Dutch New Guinea.)
92. ,, ,, ♀ f. *rectimargo* J. & T. (1922, Weyland Mtns., N. Dutch New Guinea.)
93. ,, *hyperapproximata* Roths. (1925, Rawlinson Mtns., N.E. Brit. New Guinea.)
94. ,, *angabungana* Talb. (1928, Angabunga Riv., S.W. Brit. New Guinea.)
95. *aroae yabensis* J. & T. (1922, Weyland Mtns., N. Dutch New Guinea.)

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96. *aroae yabensis* ♀ f. *brevifascia* J. & T. (1922, Weyland Mtns., N. Dutch New Guinea.)
97. „ *aroae* Ribbe. (1900, Aroa Riv., S.W. Brit. New Guinea.)
98. *fuliginosus* Kenr. (1909, Arfak Mtns., N.E. Dutch New Guinea.)
99. „ ♀ f. *ochraceus* Joic. & Noakes. (1915, Arfak Mtns, N.E. Dutch New Guinea.)

GROUP VI (*eichhorni* group.)

100. *eichhorni eichhorni* R. & J. (1904, Owgarra, S.W. Brit. New Guinea.)
101. „ *frater* Jord. (1911, Mt. Goliath, S. Dutch New Guinea.)
102. *carstensziana* Roths. (1915, Snow Mtns., S. Dutch New Guinea.)
103. *leucobalia leucobalia* Jord. (1911, Mt. Groome, N.E. Brit. New Guinea.)
104. „ *distincta* Roths. (1915, Snow Mtns., S. Dutch New Guinea.)
105. *catisa* Jord. (1911, Mt. Goliath, S. Dutch New Guinea.)

GROUP VII (*bornemanni* group.)

106. *castaneus* Kenr. (1900, Arfak Mtns., N.E. Dutch New Guinea.)
107. *pratti* Kenr. (1909, Arfak Mtns., N.E. Dutch New Guinea.)
108. *caroli caroli* Kenr. (1909, Arfak Mtns., N.E. Dutch New Guinea.
109. „ ab. *flava* Joic. & Noakes. (1915, Arfak Mtns., N.E. Dutch New Guinea.)
110. „ *wandammenensae* J. & T. (1916, Wandammen Mtns., N.E. Dutch New Guinea.)
111. *bornemanni bornemanni* Ribbe. (1900, Aroa Riv., S.W. Brit. New Guinea.)
112. *bornemanni keysseri* Roths. (1925, Rawlinson Mtns., N.E. Brit. New Guinea.)
113. *nais nais* Jord. (1911, Mt. Goliath, S. Dutch New Guinea.)
114. „ *denigrata* J. & T. 1926, Weyland Mtns., N. Dutch New Guinea
115. „ *aegle* J. & T. (1922, Biagi, N. Brit. New Guinea.)

GROUP VIII (*iltis* group).

116. *iltis iltis* Ribbe. (1900, Aroa River, S.W. Brit. New Guinea.)
117. „ *luctuosa* Jord. (1911, Mt. Groome, N.E. Brit. New Guinea.)
118. *mesoblema* Jord. (1911, Mt. Goliath, S. Dutch New Guinea.)

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119. *bakeri* Kenr. (1909, Arfak Mtns., N.E. Dutch New Guinea.)
120. *callista* Jord. (1911, Mt. Goliath, S. Dutch New Guinea.)

GROUP IX (*weiskei* group).

121. *hapalina hapalina* Jord. (1911, Mt. Goliath, S. Dutch New Guinea.)
122. ,, *conspectirubra* J. & T. (1922, Weyland Mtns., N. Dutch New Guinea.)
123. ,, *tessei* J. & T. (1916, Wandammen Mtns., N.E. Dutch New Guinea.)
124. *campbelli* J. & T. (1922, Weyland Mtns., N. Dutch New Guinea.)
125. *phippsi* J. & T. (1922, Weyland Mtns., N. Dutch New Guinea.)
126. *weiskei weiskei* Ribbe. (1900, Aroa River, S.W. Brit New Guinea.)
127. ,, *leucias* Jord. (1911, Mt. Goliath, S. Dutch New Guinea.
128. ,, *huonensis* Talb. (1928, Rawlinson Mtns., N.E. Brit New Guinea.)
129. *callima* R. & J. (1905, Angabunga River, S.W. Brit. New Guinea.)
130. *marguerita* J. & T. (1922, Weyland Mtns., N. Dutch New Guinea.)

GROUP X (*kummeri* group).

131. *kummeri kummeri* Ribbe. (1900, Aroa River, S.W. Brit. New Guinea.)
132. ,, *similis* Talb. (1928, Arfak Mtns., N.E. Dutch New Guinea.)
133. *ligata ligata* R. & J. (1904, Aroa River, S.W. Brit. New Guinea.)
134. ,, *weylandensis* J. & T. (1922, Weyland Mtns., N. Dutch New Guinea.)
135. ,, *dealbata* Talb. (1928, Arfak Mtns., N.E. Dutch New Guinea.)
136. *isocharis isocharis* R. & J. (1907, Mambare River, N. Brit. New Guinea.)
137. ,, *latiapicalis* J. & T. (1922, Weyland Mtns., N. Dutch New Guinea.)
138. *alepa alepa* Jord. (1911, Mt. Goliath, S. Dutch New Guinea.)
139. ,, *kunupiensis* J. & T. (1922, Weyland Mtns., N. Dutch New Guinea,)
140. *dixeyi* Kenr. (1909, Arfak Mtns., N.E. Dutch New Guinea.)
141. *bothwelli* Kenr. (1909, Arfak Mtns., N.E. Dutch New Guinea.)

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GROUP XI (*nigrina* group.)

142. *joiceyi* Talb. (1920, Ceram.)
143. *ornytion persephone* Stgr. (1894, Waigeu.)
144. *ornytion ornytion* G. & S. (1880, Port Moresby, S.E. Brit. New Guinea.)
145. ,, *rosselana* J. & T. (1916, Rossell Isd.)
146. *dohertyi dohertyi* Ob. (1894, Jobi.)
147. ,, *knowlei* Joic. & Noakes. (1915, Biak.)
148. *prouti* J. & T. (1923, Buru.)
149. *eximia* Roths. (1925, New Ireland.)
150. *duris* Hew. (1861, Ceram.)
151. *funerea funerea* Roths. (1894, Halmaheira.)
152. ,, *buruana* Roths. (1899, Buru.)
153. *nigrina* Fbr. (1775, S. Australia.)
154. *wollastoni* Roths. (1915, Snow Mtns., S. Dutch New Guinea.)

GROUP XII (*belladonna* group.)

155. *patrua* Leech (1890, Chang Yang, Central China.)
156. *lativitta* Leech. (1893, W. China.)
157. *subnubila* Leech. (1893, W. China.)
158. *wilemani* Jord. (1925, Formosa).
159. *sanaca sanaca* Moore. (1857, W. Himalaya.)
160. ,, ,, f. *flavalba* Marsh. (1882, W. Himalaya.)
161. ,, *perspicua* Fruh. (1911, Upper Burma.)
162. *berinda adelma* Mitis. (1893, Central China.)
163. ,, *berinda* Moore. (1872, Assam.)
164. ,, *boyleae* Butl. (1885, Darjeeling.)
165. ,, ,, f. *amarantha* Mitis. (1893, Darjeeling.)
166. *belladonna belladonna* Fbr. (1793, ? S. China.)
167. ,, *zelima* Mitis. (1893, W. China.)
168. ,, *ithiela* Butl. (1869, Sikkim.)
169. ,, *horsfieldi* Gray. (1831, Nepal.)
170. ,, *lugens* Jord. (1925, Assam.)
171. ,, *hedybia* Jord. (1925, Tenasserim.)
172. ,, *chrysorrhoea* Voll. (1865, N.E. Sumatra.)
173. ,, *surprisa* Mart. (1913, N.W. Celebes.)
174. *benasu* Mart. (1912, C. Celebes.)

GROUP XIII (*aglaia* group.)

175. *henningia henningia* Eschs. (1821, Luzon.)
176. ,, ,, f. *lucerna* Butl. (1869, Luzon.)

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177. *henningia henningia* f. *ochreopicta* Butl. (1869, Luzon.)
178. „ „ f. *hemera* Fruh. (1911, Mindoro.)
179. „ *camotana* Fruh. (1911, Camotes.)
180. „ *voconia* Fruh. (1911, Bohol.)
181. „ *ottonia* Semp. (1890, S.E. Mindanao.)
182. „ *pandemia* Wall. (1867, N. Borneo.)
183. *woodi* Talb. (1928, Mindanao.)
184. *crithoe chrysendeta* Fruh. (1911, Sambawa.)
185. *crithoe crithoe* Bdv. (1836, Java.)
186. „ „ ♀ f. *fastosa* Fruh. (1911, Java.)
187. „ „ f. *funesta* Fruh. (1911, Java.)
188. „ *bromo* Fruh. (1893, E. Java.)
189. „ *tobahana* Rogenh. (1893, N.E. Sumatra.)
190. „ *villia* Fruh. (1911, W. Sumatra.)
191. *aglaia porsenna* Cram. (1775, China.)
192. „ *curasena* Fruh. (1908, Formosa.)
193. „ *aglaia* L. (1758, India.)
194. „ *tonkiniana* Fruh. (1905, Tonkin.)
195. „ *thyra* Fruh. (1905, Annam.)
196. „ *beata* Fruh. (1905, Mergui.)
197. „ *parthenope* Wall. (1867, Singapore.)
198. „ *nigrescens* Talb. (1928, Cochin China.)
199. „ *pandecta* Stgr. (1889, Palawan.)
200. „ *balabaca* Fruh. (1911, Balabac.)
201. „ *angustifascia* Roths. (1915, N. Borneo.)
202. „ *goda* Fruh. (1906, Sumatra.)
203. „ „ ♀ f. *flavifascia* J. & T. (1924, Sumatra.)
204. „ *triglites* Talb. (1928, W. Sumatra.)
205. „ *grisea* Fruh. (1897, Nias.)
206. „ *egialea* Cram. (1777, Java,)
207. „ *horracki* J. & T. (1916, Bawean.)
208. *thysbe thysbe* Cram. (1782, China.)
209. „ *pyramus* Wall. (1867, Nepal.)
210. „ *kandha* Doh. (1886, Madras, S. India.)
211. „ *perakana* Talb. (1928, Perak.)
212. *ninus ninus* Wall. (1867, Malay Pen.)
213. „ *parthenia* Stg. (1892, N. Borneo.)
214. „ *alluvionum* Fruh. (1905, W. Sumatra.)

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GROUP XIV (*albertisi* group).

215. *albertisi albertisi* Ob. (1880, Andai, N.E. Dutch New Guinea.)
216. ,, *albiplaga* J. & T. (1922, Weyland Mtns., N. Dutch New Guinea.)
217. *discus discus* Honr. (1886, Sekar, S.W. Dutch New Guinea.)
218. ,, *larseni* Luck & Gehl. (1911, Snow Mtns., S. Dutch New Guinea.)
219. ,, *neyi* Ribbe. (1900, Aroa River, S.W. Brit. New Guinea.)

GROUP XV (*clathrata* group).

220. *elongatus* Kenr. (1911, Arfak Mtns., N.E. Dutch New Guinea.)
221. *clathrata* R. & J. (1904, Aroa River, S.W. Brit. New Guinea.)
222. *inexpectata* Roths. (1915, Snow Mtns., S. Dutch New Guinea.)
223. *catocausta* Jord. (1911, Mt. Goliath, S. Dutch New Guinea.)
224. *mira mira* R. & J. (1904, Owgarra, S.W. Brit. New Guinea.)
225. ,, *reversa* Roths. (1925, N.E. Brit. New Guinea.)
226. *mariae mariae* J. & T. (1916, Arfak Mtns., N.E. Dutch New Guinea.)
227. ,, *menooensis* J. & T. (1922, Weyland Mtns., North Dutch New Guinea.)
228. *klossi* Roths. (1915, Snow Mtns., S. Dutch New Guinea.)

GROUP XVI (*niepelti* group).

229. *meeki meeki* R. & J. (1904, Owgarra, S.W. Brit. New Guinea.)
230. ,, *septentrionalis* Roths. (1925, Rawlinson Mtns., N.E. Brit. New Guinea.)
231. ,, *neagra* Jord. (1911, Mt. Goliath, S. Dutch New Guinea.)
232. ,, *arfakensis* J. & T. (1922, Arfak Mtns., N.E. Dutch New Guinea.)
233. *niepelti* Ribbe. (1900, Aroa River, S.W. Brit. New Guinea.)

GROUP XVII (*belisama* group).

234. *descombesi leucacantha* Fruh. (1911 Sikkim.)
235. ,, ,, ♀ f. *leucogaea* Fruh. (1911, Assam.)
236. ,, ,, ♀ f. *auriga* Fruh. (1911, Sikkim.)
237. ,, *descombesi* Bdv. (1836, Cochin China.)
238. ,, *eranthos* Fruh. (1905, Malay Pen.)
239. ,, *oraia* Doh. (1891, Sambawa.)
240. ,, *lydia* Fruh. (1897, Flores.)

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241. *descombesi adonarensis* Roths. (1925, Adonara.)
242. „ *splendida* Roths. (1894, Timor.)
243. *belisama glauce* Butl. (1865, Sumatra.)
244. „ *belisama* Cram. (1779, Java.)
245. „ „ f. *angaja* Fruh. (1911, W. Java.)
246. „ „ f. *vestalina* Stgr. (1891, East Java.)
247. „ *aurantiaca* Doh. (1891, E. Java.)
248. „ *nakula* Sm. (1888, E. Java.)
249. „ „ ♂ f. *auratilis* Fruh. (1911, E. Java.)
250. „ „ ♂ f. *atisha* Fruh. (1911, E. Java.)
251. „ „ f. *erubescens* Stgr. (1891, E. Java.)
252. „ „ ♀ f. *yogini* Fruh. (1911, E. Java.)
253. „ „ ♀ f. *depicta* Fruh. (1911, E. Java.)
254. „ *balina* Fruh. (1908, Bali.)
255. *levicki* Roths. (1927, Mindanao.)
256. *zebuda* Hew. (1862, N. Celebes.)
257. *sthenoboea* Bdv. (1836, Moluccas.)
258. *eumolpe* Sm. (1889, N. Borneo.)
259. *madetes madetes* G. & S. (1878, New Ireland.)
260. „ *honrathi* Mitis. (1893, New Britain.)
261. „ *neohannoverana* Roths. (1915, New Hannover.)
262. *aruna aruna* Bdv. (1832, Dutch New Guinea.)
263. „ „ f. *madala*. (1907, N.E. Brit. New Guinea.)
264. „ *rona* Roths. (1898, Ron Isd.)
265. „ *irma* Fruh. (1907, Milne Bay.)
266. „ *inferna* Butl. (1871, N.W. Australia.)
267. *aruna arovana* Fruh. (1913, Rossell Isd.)
268. „ *rana* Swinh. (1916, Amboina.)
269. „ *seriata* Fruh. (1907, Batjan.)
270. *diaphana* Semp. (1878, S.E. Mindanao.)
271. *ellipsis* Joannis. (1901, Philippines.)
272. *aganippe* Donov. (1805, Australia.)
273. *harpalyce* Donov. (1805, S. Australia.)

GROUP XVIII (*dorimene* group.)

274. *agostina agostina* Hew. (1852, Sikkim.)
275. „ *orita* Fruh. (1910, Tonkin.)
276. „ *annamitica* Fruh. (1901, S. Annam.)
277. *melusina* Stgr. (1891, N. Celebes.)

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278. *baracasa baracasa* Semp. (1890, S.E. Mindanao.)
279. ,, *cathara* Sm. (1893, Kina Balu, N. Borneo.)
280. ,, *dives* Nicév. (1897, Penang.)
281. ,, *danala* Nicév. (1893, N.E. Sumatra.)
282. *subviridis* J. & T. (1922, Ceram.)
283. *dorylaea* Feld. (1865, Java.)
284. *dorimene* Cram. (1782, Amboina.
285. *apatela* J. & T. (1923, Buru.)
286. *eileenae* J. & T. (1926, Timor) (vice *dohertyi* Roths. praeocc. 1894.)
287. *echidna* Hew. (1861, Ceram.)
288. *rothschildi* Holl. (1900, Buru.)
289. ,, *ariela* Niep. (1921, Timor.)
290. *biaka* Joic. & Noakes. (1915, Biak.)
291. *hippodamia* Wall. (1867, Aru.)
292. *narses* Heller. (1896, New Britain.)
293. *gabia gabia* Bdv. (1832, Waigeu.)
294. ,, *felsina* Fruh. (1910, S.W. Dutch New Guinea.)
295. ,, *marinda* Hulst. (1924, S.E. Dutch New Guinea.)
296. ,, *aurantimacula* J. & T. (1922, Weyland Mtns., N. Dutch New Guinea.)
297. ,, *zarate* f. *scribonia* Fruh. (1910, N.E. Brit. New Guinea.)
298. ,, ,, f. *flavipunctata* Hag. (1897, N.E. Brit. New Guinea.)
299. ,, ,, f. *impuncta* Hag. (1897, N.E. Brit. New Guinea.)
300. ,, ,, f. *albipunctata* Hag. (1897, N.E. Brit. New Guinea.)
301. ,, *zarate* Sm. (1900, Milne Bay, S.E. Brit. New Guinea.)
302. ,, *callistrate* Sm. (1897, Fergusson Isd.)
303. ,, *bantina* Fruh. (1910, Kirwina Isd.)
304. ,, *masinissa* Fruh. (1913, Yule Isd.)
305. *omissa omissa* Roths. (1915, Aroa Riv., S.W. Brit. New Guinea.)
306. ,, *flavidior* Roths. (1915, Snow Mtns., S. Dutch New Guinea.)
307. *alberti alberti* Roths. (1904, Choiseul, Solomons.)

GROUP XIX (*isse* group).

308. *isse isse* Cram. (1775, Amboina.)
309. ,, *echo* Wall. (1867, Buru.)
310. *sacha sacha* Sm. (1895, Obi.)
311. ,, *gilolensis* Roths. (1925, Halmaheira.)

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312. *candida candida* Voll. (1865, Batjan.)
313. ,, *hempeli* Dann. (1904, Halmaheira.)
314. ,, *teuthrania* Fruh. (1913, Obi.)
315. *bosnikiana* Joic. & Noakes. (1915, Biak.)
316. *ennia mysolensis* Roths. (1915, Mysol.)
317. ,, *ennia* Wall. (1867, Waigeu.)
318. ,, *iere* Sm. (1900, Mefor.)
319. ,, *jobiana* Ob. (1894, Jobi.)
320. ,, *oetakwensis* Roths. (1915, Snow Mtns., S. Dutch New Guinea.)
321. ,, *xelianthe* Sm. (1900, Milne Bay.)
322. ,, *saturata* Roths. (1915, Goodenough Isd.)
323. ,, *limbata* Roths. (1915, Sud Est.)
324. ,, *nigidius* Misk. (1884, N. Australia.)
325. ,, *tindalii* J. & T. (1926, Coen Riv., N. Queensland) (vice *dorothea* Tindale praeocc. 1923.)
326. *multicolor* Joic. & Noakes. (1915, Biak.)
327. *lytaea lytaea* Godm. (1878, New Britain.)
328. ,, *smithi* Talb. (1928, New Georgia) (vice *georgiana* Sm. praeocc. 1895.)

Sub-genus *Piccarda* Grote.

329. *eucharis* Drury. (1773, India.)
330. *hyparete hierte* Hbn. (1816, Canton, S. China.)
331. ,, ,, f. *stolli* Butl. (1872, China.)
332. ,, *peirene* Fruh. (1908, Formosa.)
333. ,, ,, f. *maenia* Fruh. (1910, Formosa.)
334. ,, *indica* Wall. (1867, Burma.)
335. ,, *ethire* Doh. (1887, S. India.)
336. ,, *metarete* Butl. (1879, Malay Pen.)
337. ,, *diva* Fruh. (1889, N. Borneo.)
338. ,, *despoliata* Fruh. (1910, Sumatra.)
339. ,, *jataka* Fruh. (1906, Batu Is.)
340. ,, *niasana* Kheil. (1884, Nias.)
341. ,, ,, f. *amarilla* Kheil. (1884, Nias.)
342. ,, *hypopelia* Hag. (1898, Mentawej Is.)
343. ,, *haemorrhoea* Voll. (1865, Banka.)
344. ,, *aurago* Snell. (1890, Billiton.)
345. ,, ,, f. *simplex* Butl. (1897, Billiton.)

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346. *hyparete hyparete* L. (1758, Java.)
347. „ „ ♀ f. *aureivenula* Fruh. (1910, Java.)
348. „ „ ♂ f. *albiapicalis* J. & T. (1925, Java.)
349. „ „ f. *flavimacula* J. & T. (1925, S. Java.)
350. „ *luzonensis* Feld. (1862, Luzon.)
351. „ „ f. *mindorensis* Fruh. (1910, Mindoro.)
352. „ „ f. *mindanaensis* Mitis. (1893, S.E. Mindanao.)
353. „ *panayensis* Roths. (1925, Panay.)
354. „ *domorana* Fruh. (1911, Domoran.)
355. „ *palawanica* Stgr. (1889, Palawan.)
356. „ *lucina* Dist. (1887, Sulu.)
357. *rosenbergi rosenbergi* Voll. (1865, S. Celebes.)
358. „ „ f. *chrysoleuca* Mitis (1893, S. Celebes.)
359. „ *lorquini* Feld. (1865, N. Celebes.)
360. „ *saleyerana* Roths. (1915, Saleyer Is.)
361. *mitisi* Stgr. (1894, Sula.)
362. *periboea periboea* Godt. (1819, Java.)
363. „ *wallacei* Roths. (1892, Bali.)
364. „ *livia* Fruh. (1896, Lombok.)
365. „ *pagenstecheri* Fruh. (1910, Sambawa.)
366. „ *alorensis* Fruh. (1889, Alor.)
367. *fasciata* Roths. (1894, Sumba.)
368. *sambawana minerva* Fruh. (1896, Lombok.)
369. „ *sambawana* Roths. (1894, Sambawa.)
370. „ *everetti* Roths. (1925, S. Flores.)
371. *poecilea poecilea* Voll. (1865, Halmaheira.)
372. „ *edela* Fruh. (1910, Obi.)
373. *caeneus caeneus* L. (1758, Amboina.)
374. „ *philotis* Wall. (1867, Buru.)
375. *timorensis timorensis* Bdv. (1836, Timor.)
376. „ *moaensis* Roths. (1915, Moa Isd.)
377. „ *romaensis* Roths. (1915, Roma Isd.)
378. „ *ardesiaca* Roths. (1915, Dammer Isd.)
379. „ *gardineri* Fruh. (1904, Tenimber.)
380. *mysis mysis* Fbr. (1775, Australia.)
381. „ *aestiva* Butl. (1897, N.W. Australia.)
382. „ *nemea* Fruh. (1910, S.W. Dutch New Guinea.)
383. „ *aruensis* Mitis. (1893, Aru.)
384. „ *maforensis* Roths. (1915, Mafor.)
385. „ *lara* Bdv. (1836, Dutch New Guinea.)

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386. *mysis intermedia* Mitis. (1893, N.E. Brit. New Guinea.)
387. ,, *onca* Fruh. (1910, Milne Bay.)
388. ,, *roselliana* Roths. (1915, Rossell Isd.)
389. ,, *maga* Sm. (1897, Sud Est.)
390. ,, *goodenovii* Roths. (1915, Goodenough Isd.)
391. ,, *cruentata* Butl. (1865, Mysol.)
392. *euphemia* Sm. (1894, Biak.)
393. *salvini* Butl. (1882, New Britain.)
394. *bagoe bagoe* Bdv. (1832, New Ireland.)
395. ,, *nausana* Fruh. (1905, Nausa Laut.)
396. ,, *restricta* Roths. (1925, New Hanover.)
397. *schoenbergi schoenbergi* Roths. (1895, Bougainville.)
398. *schoenbergi choiseuli* Roths. (1904, Choiseul.)
399. ,, *isabellae* Roths. (1901, Ysabel.)
400. *argenthona argenthona* Fbr. (1793, Australia.)
401. ,, *fragalactea* Butl. (1869, N. Australia.)
402. ,, *balli* Hulst. (1923, S.E. Dutch New Guinea.)
403. ,, ♀ f. *seminigra* Fruh. (1910, Queensland.)

ADDENDA.

404. (41. A) *dice mitisana* ab. *pictula* Stnd. (1916. Dutch New Guinea.)
405. (94. A) *aroae angiensis* Talb. (1928, Arfak Mtns., N.E. Dutch New Guinea.)
406. (160. A) *sanaca oreas* Talb. (1928. Sikkim.)

5.—GEOGRAPHICAL KEY TO FORMS OF DELIAS.

(The number given to the form shows its position in the classification adopted.)

ADONARA.

241. *descombesi adonarensis* Roths.

ALOR ISLAND.

241. *descombesi adonarensis* Roths.
366. *periboea alorensis* Fruh.

AMBOINA ISLAND.

26. *manuselensis brooksi* J. & T.
268. *aruna rana* Swinh.
284. *dorimene* Cram.
287. *echidna* Hew.
308. *isse isse* Cram.
373. *caeneus caeneus* Linn.

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ANDAMAN ISLANDS.

193. *aglaia aglaia* Linn.
209. *thysbe pyramus* Wall.

ANNAM.

195. *aglaia thyra* Fruh.
237. *descombesi descombesi* Bdv.
276. *agostina annamitica* Fruh.
334. *hyparete indica* Wall.

ARU ISLANDS.

34. *ribbei* Röb.
291. *hippodamia* Wall.
383. *mysis aruensis* Mitis.

AUSTRALIA (NORTH).

32. *nysa nysa* Fabr.
33. *nysa nivira* W. & L. (Cape York).
153. *nigrina* Fabr.
266. *aruna inferna* Butl. (Cape York).
272. *aganippe* Donov.
324. *ennia nigidius* Misk.
325. „ *tindalii* J. & T. (Cape York).
381. *mysis oestiva* Butl.
401. *argenthona fragalactea* Butl.
403. „ „ f. *seminigra* Fruh.

AUSTRALIA (NORTH-WEST).

272. *aganippe* Donov.
273. *harpalyce* Donov.
401. *argenthona fragalactea* Butl.

AUSTRALIA (SOUTH-EAST).

32. *nysa nysa* Fabr.
153. *nigrina* Fabr.
272. *aganippe* Donov.
273. *harpalyce* Donov.
400. *argenthona argenthona* Fabr.

BABBER ISLAND.

376. *timorensis moaensis* Roths.

BALI ISLAND.

254. *belisama balina* Fruh.
346. *hyparete hyparete* Linn.
363. *periboea wallacei* Roths.

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BANGKEI ISLAND.

8. *kuehni kuehni* Honr.
361. *mitisi* Stgr.

BANKA ISLAND.

202. *aglaia goda* Fruh.
343. *hyparete haemorrhaea* Voll.
345. ,, *aurago* f. *simplex* Butl.

BATJAN ISLAND.

50. *chrysomelaena chrysomelaena* Voll.
269. *aruna seriata* Fruh.
312. *candida candida* Voll.
371. *poecilea poecilea* Voll.

BATU ISLANDS.

339. *hyparete jataka* Fruh.

BAWEAN ISLAND.

207. *aglaia horracki* J. & T.
346. *hyparete hyparete* Linn.

BILLITON ISLAND.

202. *aglaia goda* Fruh.
344. *hyparete aurago* Snell.
345. ,, ,, f. *simplex* Butl.

BORNEO.

4. *singhapura indistincta* Fruh.
13. *georgina cinerascens* Mitis.
20. *blanca nausicaa* Fruh.
182. *henningia pandemia* Wall.
201. *aglaia angustifascia* Roths.
213. *ninus parthenia* Stgr.
258. *eumolpe* Sm.
279. *baracasa cathara* Sm.
337. *hyparete diva* Fruh.

BORNEO (BALABAC AND NORTH COAST).

200. *aglaia balabaca* Fruh.

BOUGAINVILLE ISLAND.

397. *schoenbergi schoenbergi* Roths.

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BURMA (NORTH) AND SHAN STATES.

1. *agoranis* Sm.
155. *patrua* Leech.
170, *belladonna lugens* Jord. (Upper Shan States).
171. „ *hedybia* Jord.
193. *aglaia aglaia* Linn.
209. *thysbe pyramus* Wall.
234. *descombesi leucacantha* Fruh.
274. *agostina agostina* Hew.
334. *hyparete indica* Wall.

BURMA (NORTH-WEST).

161. *sanaca perspicua* Fruh.
170. *belladona lugens* Jord.

BURMA (NORTH-EAST).

167. *belladonna zelima* Mitis.

BURU.

22. *dumasi* Roths.
23. *vidua* J. & T.
24. *eschatia* J. & T.
60. *schmassmanni* J. & T.
148. *prouti* J. & T.
152. *funerea buruana* Roths.
285. *apatela* J. & T.
288. *rothschildi* Holl.
309. *isse echo* Wall.
374. *caeneus philotis* Wall.

BUTON ISLAND. No records.

CELEBES (NORTH to CENTRAL).

7. *kuehni prinsi* Mart.
173. *belladonna surprisa* Mart.
174. *benasu* Mart.
256. *zebuda* Hew.
277. *melusina* Stgr.
359. *rosenbergi lorquini* Feld.

CELEBES (SOUTH).

15. *georgina battana* Fruh.
16. „ „ f. *defasciata* Niep.
17. „ „ f. *auricoma* Fruh.
256. *zebuda* Hew.
357. *rosenbergi rosenbergi* Voll.
358. „ „ f. *chrysoleuca* Mitis.

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CERAM (including SAPARUA and GISSER).

21. *schuppi* Talb.
25. *manuselensis manuselensis* J. & T.
61. *stresemanni* Roths.
62. ,, f. *oenus* Talb.
63. ,, f. *mediofasciata* Talb.
64. ,, f. *lutea* Talb.
65. ,, f. *basiflava* Talb.
142. *joiceyi* Talb.
150. *duris* Hew.
282. *subviridis* J. & T.
284. *dorimene* Cram.
287. *echidna* Hew.
308. *isse isse* Cram.
373. *caeneus caeneus* L.

CEYLON.

329. *eucharis* Drury.

CHINA (SOUTH & EAST).

166. *belladonna belladonna* Fabr.?
191. *aglaia porsenna* Cram.
208. *thysbe thysbe* Cram.
330. *hyparete hierte* Hbn.
331. ,, ,, f. *stolli* Butl.

CHINA (WEST & CENTRAL).

155. *patrua* Leech.
156. *lativitta* Leech.
157. *subnubila* Leech.
167. *belladonna zelima* Mitis.
208. *thysbe thysbe* Cram.

CHOISEUL ISLAND.

307. *alberti* Roths.
398. *schoenbergi choiseuli* Roths.

COCHIN CHINA.

198. *aglaia nigrescens* Talb.
237. *descombesi descombesi* Bdv.
334. *hyparete indica* Wall.

DAMMER ISLAND.

378. *timorensis ardesiaca* Roths.

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FERGUSSON ISLAND.
57. *caliban caliban* Sm.
265. *aruna irma* Fruh.
302. *gabia callistrate* Sm.
390. *mysis goodenovii* Roths.

FLORES ISLAND.
240. *descombesi lydia* Fruh.
370. *sambawana everetti* Roths.

FORMOSA.
156. *lativitta* Leech.
158. *wilemani* Jord.
192. *aglaia curasena* Fruh.
332. *hyparete peirene* Fruh.
333. „ „ f. *maenia* Fruh.

GEBI ISLAND (NORTH MOLUCCAS).
293. *gabia gabia* Bdv.

GOODENOUGH ISLAND.
58. *caliban satisbona* Roths.
302. *gabia callistrate* Sm.
322. *ennia saturata* Roths.
390. *mysis goodenovii* Roths.

GORAM LAUT.
373. *caeneus caeneus* Linn.

HAINAN ISLAND.
191. *aglaia porsenna* Cram.
334. *hyparete indica* Wall.

HALMAHEIRA ISLAND (and MORTY I.).
27. *waterstradti* Roths.
51. *chrysomelaena prodigialis* Fruh.
151. *funerea funerea* Roths.
269. *aruna seriata* Fruh.
311. *sacha gilolensis* Roths.
313. *candida hempeli* Dann.
371. *poecilea poecilea* Voll.

INDIA (NORTH-WEST).
159. *sanaca sanaca* Moore.
160. „ „ f. *flavalba* Marsh.
169. *belladonna horsfieldi* Gray.
334. *hyparete indica* Wall (rare).

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INDIA (NORTH).

164. *berinda boyleae* Butl.
165. ,, ,, f. *amarantha* Mitis.
168. *belladona ithiela* Butl. (600—1,200m.).
169. ,, *horsfieldi* Gray.
193. *aglaia aglaia* Linn.
209. *thysbe pyramus* Wall.
234. *descombesi leucacantha* Fruh.
235. ,, ,, f. *leucogaea* Fruh.
236. ,, ,, f. *auriga* Fruh.
274. *agostina agostina* Hew.
329. *eucharis* Drury.
334. *hyparete indica* Wall.
406. *sanaca oreas* Talb.

INDIA (ASSAM).

163. *berinda berinda* Moore.
170. *belladonna lugens* Jord.
193. *aglaia aglaia* Linn.
209. *thysbe pyramus* Wall.
234. *descombesi leucacantha* Fruh.
274. *agostina agostina* Hew.
329. *eucharis* Drury.
334. *hyparete indica* Wall.

INDIA (SOUTH).

210. *thysbe kandha* Doh.
329. *eucharis* Drury.
335. *hyparete ethire* Doh.

JAVA (WEST).

30. *momea momea* Bdv.
185. *crithoe crithoe* Bdv.
186. ,, ,, f. *fastosa* Fruh.
187. ,, ,, f. *funesta* Fruh.
206. *aglaia egialea* Cram.
244. *belisama belisama* Cram.
245. ,, ,, f. *angaja* Fruh.
246. ,, ,, f. *vestalina* Stgr.
247. ,, *aurantiaca* Doh.
283. *dorylaea* Feld.
346. *hyparete hyparete* Linn.
348. ,, ,, f. *albiapicalis* J. & T.
349. ,, ,, f. *flavimacula* J. & T.
362. *periboea periboea* Godt.

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JAVA (EAST).
31. *fruhstorferi* Honr.
188. *crithoe bromo* Fruh.
206. *aglaia egialea* Cram.
246. *belisama* f. *vestalina* Stgr.
248. *belisama nakula* Smith.
249. ,, ,, ♂ f. *auratilis* Fruh.
250. ,, ,, ♂ f. *atisha* Fruh.
251. ,, ,, ♂ f. *erubescens* Stgr.
252. ,, ,, ♀ f. *yogini* Fruh.
253. ,, ,, ♀ f. *depicta* Fruh.
346. *hyparete hyparete* Linn.
347. ,, ,, f. *aureivenula* Fruh.
362. *periboea periboea* Godt.

JOBI ISLAND.
146. *dohertyi dohertyi* Ob.
319. *ennia jobiana* Ob.

JOLO and SULU ISLANDS.
356. *hyparete lucina* Dist.

KANGEAN ISLAND.
346. *hyparete hyparete* Linn.
362. *periboea periboea* Godt.

KEY ISLANDS. No records.

KIRWINA ISLAND.
303. *gabia bantina* Fruh.

LOMBOK ISLAND.
239. *descombesi oraia* Doh.
364. *periboea livia* Fruh.
368. *sambawana minerva* Fruh.

MALAY PENINSULA.
2. *singhapura singhapura* Wall.
10. *georgina orphne* Wall.
11. ,, *tahanica* Roths. (Mt. Jahan).
197. *aglaia parthenope* Wall.
211. *thysbe perakana* Talb.
212. *ninus ninus* Wall.
238. *descombesi eranthos* Fruh.
280. *baracasa dives* Nicev.
336. *hyparete metarete* Butl.

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MEFOR ISLAND.

38. *enniana majoripuncta* J. & T.
318. *ennia iere* Sm.
384. *mysis maforensis* Roths.

MENTAWEJ ISLANDS.

342. *hyparete hypopelia* Hag.

MERGUI ISLANDS.

196. *aglaia beata* Fruh.

MOA ISLAND.

376. *timorensis moaensis* Roths.

MOROTAI ISLAND.

371. *poecilea poecilea* Voll.

MYSOL ISLAND.

36. *enniana obsoleta* Roths.
316. *ennia mysolensis* Roths.
391. *mysis cruentata* Butl.

NAUSA LAUT.

395. *bagoe nausana* Fruh.

NEW BRITAIN.

59. *totila* Heller.
260. *madetes honrathi* Mitis.
292. *narses* Heller.
327. *lytaea lytaea* Godm.
393. *salvini* Butl.

NEW GEORGIA.

328. *lytaea smithi* Talb.

NEW HANNOVER.

261. *madetes neohannoverana* Roths.
396. *bagoe restricta* Roths.

NEW IRELAND.

59. *totila* Heller.
149. *eximia* Roths.
259. *madetes madetes* G. & S.
292. *narses* Heller.
394. *bagoe bagoe* Bdv.

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1. New Guinea (Dutch).
   A. North-East (including Arfak and Wandammen Mountains).
      39. *enniana kapaura* Roths.
      41. *dice mitisana* Strand.
      404. ,, ,, ♂ f. *pictula* Strand.
      42. ,, ,, ♀ f. *latoclavata* V. Eecke.
      43. ,, ,, ♀ f. *leucana* Strand.
      54. *ladas levis* J. & T.
      68. *geraldina geraldina* Sm.
      70. *microsticha* R. & J.
      73. *flavopicta* Jord.
      74. ,, ♀ f. *albifascia* Talb.
      76. *imitator* Kenr.
      81. *heroni heroni* Kenr.
      82. ,, ,, f. *albo-oculatus* J. & N.
      84. *nigropunctata* J. & N.
      85. *thompsoni* J. & T.
      87. *cuningputi jordani* Kenr.
      98. *fuliginosus* Kenr.
      99. ,, ♀ f. *ochraceus* J. & N.
      106. *castaneus* Kenr.
      108. *caroli caroli* Kenr.
      109. ,, ,, ab. *flava* J. & N.
      110. ,, *wandammenensae* J. & T.
      119. *bakeri* Kenr.
      123. *hapalina tessei* J. & T.
      132. *kummeri similis* Talb.
      135. *ligata dealbata* Talb.
      140. *dixeyi* Kenr.
      141. *bothwelli* Kenr.
      143. *ornytion persephone* Stgr.
      215. *albertisi albertisi* Ob.
      220. *elongatus* Kenr.
      226. *mariae mariae* J. & T.
      232. *meeki arfakensis* J. & T.
      262. *aruna aruna* Bdv.
      296. *gabia aurantimacula* J. & T.
      305. *omissa omissa* Roths.
      317. *ennia ennia* Wall.
      321. ,, ,, f. *xelianthe* Sm.
      385. *mysis lara* Bdv.
      405. *aroae angiensis* Talb.

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NEW GUINEA (DUTCH)—*continued.*

B. NORTH (including HUMBOLDT BAY and WEYLAND MOUNTAINS).

39. *enniana kapaura* Roths.
45. *dice latimarginata* J. & T.
54. *ladas levis* J. & T.
66. *lecerfi* J. & T.
68. *geraldina geraldina* Sm.
70. *microsticha* R. & J.
71. „ ♀ f. *albifascia* Talb.
75. *rileyi* J. & T.
78. *hypomelas rubrostriata* J. & T.
86. *citrona* J. & T.
91. *pheres approximata* J. & T.
92. „ „ ♀ f. *rectimargo* J. & T.
95. *aroae yabensis* J. & T.
96. „ „ ♀ f. *brevifascia* J. & T.
105. *catisa* Jord.
114. *nais denigrata* J. & T.
118. *mesoblema* Jord.
122. *hapalina conspectirubra* J. & T.
124. *campbelli* J. & T.
125. *phippsi* J. & T.
130. *marguerita* J. & T.
131. *kummeri kummeri* Ribbe.
134. *ligata weylandensis* J. & T.
137. *isocharis latiapicalis* J. & T.
139. *alepa kunupiensis* J. & T.
143. *ornytion persephone* Stgr.
216. *albertisi albiplaga* J. & T.
217. *discus discus* Honr.
227. *mariae menoensis* J. & T.
231. *meeki neagra* Jord.
262. *aruna aruna* Bdv.
296. *gabia aurantimacula* J. & T.
305. *omissa omissa* Roths.
317. *ennia ennia* Wall.
385. *mysis lara* Bdv.

C. WEST (including ONIN and KAPAUR).

39. *enniana kapaura* Roths.
44. *dice dice* Voll.
143. *ornytion persephone* Stgr.

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NEW GUINEA (DUTCH)—*continued.*

C. WEST—*continued.*

217. *discus discus* Honr.
262. *aruna aruna* Bdv.
294. *gabia felsina* Fruh.
380. *mysis lara* Bdv.

D. SOUTH (SNOW MOUNTAINS).

40. *enniana reducta* Roths.
46. *dice fulvoflava* Roths.
54. *ladas levis* J. & T.
68. *geraldina geraldina* Sm.
102. *carstensziana* Roths.
104. *leucobalia distincta* Roths.
114. *nais denigrata* J. & T.
118. *mesoblema* Jord.
127. *weiskei leucias* Jord.
131. *kummeri kummeri* Ribbe.
136. *isocharis isocharis* R. & J.
138. *alepa alepa* Jord.
143. *ornytion persephone* Stgr.
154. *wollastoni* Roths.
218. *discus larseni* Luck & Gehl.
222. *inexpectata* Roths.
228. *klossi* Roths.
231. *meeki neagra* Jord.
265. *aruna irma* Fruh.
294. *gabia felsina* Fruh.
306. *omissa flavidior* Roths.
320. *ennia oetakwensis* Roths.
385. *mysis lara* Bdv.

E. SOUTH (EILANDEN RIVER and MOUNT GOLIATH).

40. *enniana reducta* Roths.
46. *dice fulvoflava* Roths.
70. *microsticha* R. & J.
79. *hypomelas conversa* Jord.
88. *cuningputi fascelis* Jord.
90. *pheres pheres* Jord.
101. *eichhorni frater* Jord.
105. *catisa* Jord.

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NEW GUINEA (DUTCH)—*continued.*

E. SOUTH—*continued.*

113. *nais nais* Jord.
118. *mesoblema* Jord.
120. *callista* Jord.
121. *hapalina hapalina* Jord.
127. *weiskei leucias* Jord.
138. *alepa alepa* Jord.
223. *catocausta* Jord.
231. *mecki neagra* Jord.
265. *aruna irma* Fruh.
294. *gabia felsina* Fruh.
385. *mysis lara* Bdv.

F. CENTRAL (North of MOUNT GOLIATH).

113. *nais nais* Jord.
217. *discus discus* Honr.
262. *aruna aruna* Bdv.
301. *gabia zarate* Sm.
385. *mysis lara* Bdv.

G. SOUTH-EAST (including MERAUKE, MAPPI RIVER, DIGOEL RIVER).

265. *aruna irma* Fruh.
295. *gabia marinda* Hulst.
382. *mysis nemea* Fruh.
402. *argenthona balli* Hulst.

2. NEW GUINEA (BRITISH).

A. NORTH-EAST (MANDATED TERRITORY and including RAWLINSON MOUNTAINS and MOUNT GROOME).

55. *ladas ladas* Sm.
56. *viridomara* Fruh.
68. *geraldina geraldina* Sm.
72. *microsticha terranea* Talb.
80. *hypomelas rawlinsoni* Talb.
93. *pheres hyperapproximata* Roths.
103. *leucobalia leucobalia* Jord.
112. *bornemanni keysseri* Roths.
117. *iltis luctuosa* Jord.
128. *weiskei huonensis* Talb.

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NEW GUINEA (BRITISH)—*continued.*

A. NORTH-EAST—*continued.*

131. *kummeri kummeri* Ribbe.
133. *ligata ligata* R. & J.
136. *isocharis isocharis* R. & J. (Rawlinson Mountains.).
144. *ornytion ornytion* G. & S.
225. *mira reversa* Roths.
230. *meeki septentrionalis* Roths.
263. *aruna madala* Fruh.
297. *gabia zarate* f. *scribonia* Fruh.
298. „ „ f. *flavipunctata* Hag.
299. „ „ f. *impuncta* Hag.
300. „ „ f. *albipunctata* Hag.
301. *gabia zarate* Sm.
305. *omissa omissa* Roths.
321. *ennia xelianthe* Sm.
386. *mysis intermedia* Mitis.

B. NORTH (including HYDROGRAPHER MOUNTAINS, COLLINGWOOD BAY, MAMBARE RIVER, KUMASI and BIAGI).

40. *enniana reducta* Roths.
55. *ladas ladas* Sm.
67. *sagessa* Fruh.
69. *eudiabolus* Roths.
70. *microsticha* R. & J.
77. *hypomelas hypomelas* R. & J.
83. *itamputi* Ribbe.
97. *aroae aroae* Ribbe.
111. *bornemanni bornemanni* Ribbe.
115. *nais aegle* J. & T.
129. *callima* R. & J.
131. *kummeri kummeri* Ribbe.
133. *ligata ligata* R. & J.
136. *isocharis isocharis* R. & J.
233. *niepelti* Ribbe.
265. *aruna irma* Fruh.
297. *gabia zarate* f. *scribonia* Fruh.
301. „ *zarate* Sm.
321. *ennia xelianthe* Sm.
387. *mysis onca* Fruh.

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NEW GUINEA (BRITISH)—*continued.*

C. SOUTH-EAST (including MILNE BAY, PORT MORESBY, SAMARAI and SARIBA Is.).

48. *dice samarai* J. & T.
55. *ladas ladas* Sm.
144. *ornytion ornytion* G. & S.
265. *aruna irma* Fruh.
301. *gabia zarate* Sm.
321. *ennia xelianthe* Sm.
387. *mysis onca* Fruh.

D. SOUTH-WEST (OWEN STANLEY MOUNTAINS, with districts of AROA, EKEIKEI, KEBEA and ANGABUNGA.).

40. *enniana reducta* Roths.
47. *dice ecceicei* J. & T.
55. *ladas ladas* Sm.
67. *sagessa* Fruh.
68. *geraldina geraldina* Sm.
69. *eudiabolus* Roths.
70. *microsticha* R. & J.
71. „ ♀ f. *albifascia* Talb.
83. *itamputi* Ribbe.
89. *cuningputi cuningputi* Ribbe.
94. *pheres angabungana* Talb.
97. *aroae aroae* Ribbe.
100. *eichhorni eichhorni* R. & J.
111. *bornemanni bornemanni* Ribbe.
115. *nais aegle* J. & T.
116. *iltis iltis* Ribbe.
126. *weiskei weiskei* Ribbe.
129. *callima* R. & J.
131. *kummeri kummeri* Ribbe.
133. *ligata ligata* R. & J.
136. *isocharis isocharis* R. & J.
144. *ornytion ornytion* G. & S.
219. *discus neyi* Ribbe.
221. *clathrata* R. & J.
223. *catocausta* Jord.
224. *mira mira* R. & J.

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NEW GUINEA (BRITISH)—*continued.*

229. *meeki meeki* R. & J.
233. *niepelti* Ribbe.
265. *aruna irma* Fruh.
297. *gabia zarate* f. *scribonia* Fruh.
305. *omissa omissa* Roths.
321. *ennia xelianthe* Sm.
387. *mysis onca* Fruh.

E. WEST (DARU ISLAND and Coast opposite CAPE YORK).

402. *argenthona balli* Hulst.

NIAS ISLAND.

205. *aglaia grisea* Fruh.
340. *hyparete niasana* Kheil.
341. „ „ f. *amarilla* Kheil.

OBI ISLAND.

269. *aruna seriata* Fruh.
310. *sacha sacha* Sm.
314. *candida teuthrania* Fruh.
372. *poecilea edela* Fruh.

PALAWAN ISLAND.

182. *henningia pandemia* Wall.
199. *aglaia pandecta* Stgr.
355. *hyparete palawanica* Stgr.

PHILIPPINES.

BOHOL ISLAND.

180. *henningia voconia* Fruh.
350. *hyparete luzonensis* Feld.
351. „ „ f. *mindorensis* Fruh.

CEBU ISLAND.

5. *themis themis* Hew.
270. *diaphana* Semp.
350. *hyparete luzonensis* Feld.
351. „ „ f. *mindorensis* Fruh.

CAMOTES ISLANDS.

179. *henningia camotana* Fruh.
350. *hyparete luzonensis* Feld.
351. „ „ f. *mindorensis* Fruh.

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PHILIPPINES—*continued.*

DOMORAN ISLAND.

354. *hyparete domorana* Fruh.

LUZON ISLAND.

6. *themis soteira* Fruh.
14. *georgina georgina* Feld.
18. *blanca blanca* Feld.
175. *henningia henningia* Eschs.
176. „ „ f. *lucerna* Butl.
177. „ „ f. *ochreopicta* Butl.
270. *diaphana* Semp.
350. *hyparete luzonensis* Feld.

MINDANAO ISLAND.

5. *themis themis* Hew.
19. *blanca apameia* Fruh.
178. *henningia henningia* f. *hemera* Fruh.
181. „ *ottonia* Semp.
183. *woodi* Talb.
200. *aglaia balabaca* Fruh.
255. *levicki* Roths.
270. *diaphana* Semp.
278. *baracasa baracasa* Fruh.
350. *hyparete luzonensis* Feld.
352. „ „ f. *mindanaensis* Mitis.

MINDORO ISLAND.

178. *henningia henningia* f. *hemera* Fruh.
350. *hyparete luzonensis* Feld.
351. „ „ f. *mindorensis* Fruh.

PANAY ISLAND.

176. ? *henningia henningia* f. *lucerna* Butl.
353. *hyparete panayensis* Roths.

POLILLO ISLAND.

5. *themis themis* Hew.
175. *henningia henningia* Eschs.

SAMAR ISLAND.

177. *henningia henningia* f. *ochreopicta* Butl.
178. „ „ f. *hemera* Fruh.

UNKNOWN LOCALITY.

271. *ellipsis* Joann. (provisionally referred to the Philippines.

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PURA ISLAND.

241. *descombesi adonarensis* Roths.
366. *periboea alorensis* Fruh.

RIOUW LINGGA IS.

338. *hyparete despoliata* Fruh. ?

ROMA ISLAND.

265. *aruna irma* Fruh.
377. *timorensis romaensis* Roths.

RON ISLAND.

264. *aruna rona* Roths.

ROSSELL ISLAND.

49. *dice rectifascia* Talb.
145. *ornytion rossellana* J. & T.
267. *aruna arovana* Fruh.
388. *mysis roselliana* Roths.

ST. AIGNAN ISLAND.

144. *ornytion ornytion* G. & S.

SALAYER ISLAND.

360. *rosenbergi salayerana* Roths.

SCHOUTEN ISLANDS.

35. *maudei* J. & N.
52. *talboti* J. & N.
147. *dohertyi knowlei* J. & N.
290. *biaka* J. & N.
315. *bosnikiana* J. & N.
326. *multicolor* J. & N.
392. *euphemia* Sm.

SIAM.

1. *agoranis* Sm.
2. *singhapura singhapura* Wall.
194. *aglaia tonkiniana* Fruh.
197. ,, *parthenope* Wall.
209. *thysbe pyramus* Wall.
234. *descombesi leucacantha* Fruh.
274. *agostina agostina* Hew.
334. *hyparete indica* Wall.
A form of the *belladonna* group.

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SUD-EST ISLAND.

49. *dice rectifascia* Talb.
144. *ornytion ornytion* G. & S.
267. *aruna arovana* Fruh.
323. *ennia limbata* Roths.
389. *mysis maga* Sm.

SULA ISLANDS.

9. *kuehni sulana* Stgr.

SUMATRA.

A. NORTH and NORTH-EAST.

28. *momea hageni* Rogenh.
172. *belladonna chrysorrhoea* Voll.
189. *crithoe tobahana* Rogenh.
202. *aglaia goda* Fruh.
203. „ „ ♀ f. *flavifascia* Talb.
214. *ninus alluviorum* Fruh.
243. *belisama glauce* Butl.
281. *baracasa danala* Nicev.
338. *hyparete despoliata* Fruh.

B. SOUTH-EAST.

3. *singhapura acuta* Roths.

C. SOUTH-WEST.

29. *momea huphinoides* J. & T.
172. *belladonna chrysorrhoea* Voll.
189. *crithoe tobahana* Rogenh.
243. *belisama glauce* Butl.
281. *baracasa danala* Nicev.
338. *hyparete despoliata* Fruh.

D. WEST.

12. *georgina simanubum* Hag.
190. *crithoe villia* Fruh.
204. *aglaia triglites* Talb.

SUMBA ISLAND.

367. *fasciata*, Roths.

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SAMBAWA ISLAND.

184. *crithoe chrysendeta* Fruh.
239. *descombesi oraia* Doh.
365. *periboea pagenstecheri* Fruh.
369. *sambawana sambawana* Roths.

TENASSERIM.

1. *agoranis* Sm.
171. *belladonna hedybia* Jord.
196. *aglaia beata* Fruh.
209. *thysbe pyramus* Wall.
234. *descombesi leucacantha* Fruh.
334. *hyparete indica* Wall. (Upper.)
336. ,, *metarete* Butl. (Lower.)

TENIMBER ISLAND.

379. *timorensis gardineri* Fruh.

TIBET.

155. *patrua* Leech.
156. *lativitta* Leech. (S.E.)
157. *subnubila* Leech. (S.E.)
161. *sanaca perspicua* Fruh. (S.E.)
167. *belladonna zelima* Mitis.
168. ,, *ithiela* Butl. (S.E.)
191. *aglaia porsenna* Cram. (S.E.)
208. *thysbe thysbe* Cram. (S.E.)

TIMOR.

242. *descombesi splendida* Roths.
286. *eileenae* J. & T.
289. *rothschildi ariela* Niep.
375. *timorensis timorensis* Bdv.

TONKIN.

171. *belladonna hedybia* Jord.
194. *aglaia tonkiniana* Fruh.
209. *thysbe pyramus* Wall.
275. *agostina orita* Fruh.
334. *hyparete indica* Wall.

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WAIGEU ISLAND.

37. *enniana enniana* Ob.
41. *dice mitisana* Strand.
43. „ „ ♀ f. *leucana* Stnd.
53. *ladas waigeuensis* J. & T.
143. *ornytion persephone* Stgr.
262. *aruna aruna* Bdv.
293. *gabia gabia* Bdv.
317. *ennia ennia* Wall.
385. *mysis lara* Bdv.

WETTER ISLAND.

375. *timorensis timorensis* Bdv.

YSABEL ISLAND.

399. *schoenbergi isabellae* Roths.

YULE ISLAND.

55. *ladas ladas* Sm.
219. *discus neyi* Ribbe.
265. *aruna irma* Fruh.
304. *gabia masinissa* Fruh.
387. *mysis onca* Fruh.

YUNNAN.

156. *lativitta* Leech.
157. *subnubila* Leech.
161. *sanaca perspicua* Fruh.
167. *belladonna zelima* Mitis.
191. *aglaia porsenna* Cram.

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MONOGRAPH

OF THE

PIERINE GENUS *Delias*

BY

G. TALBOT

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6.—Geographical Distribution.

Jordan, *Nov. Zool.*, xviii, p. 580 (1911) (New Guinea species).

Distribution.—Central and Southern China, Tibet, Formosa, Hainan, through India westwards to the Solomons and Australia. All faunistic areas within this range in which collecting has been done have produced *Delias* with a single exception. No species has been recorded from the Key Islands. It is a peculiar fact that no species of *Loranthaceae*, the common food-plant of *Delias*, has been recorded from these islands. I am indebted to the authorities at Kew for this information, and they add that: "As however numerous species of the family occur in most of the surrounding islands, it is practically certain that the family is represented in the Key Islands themselves." Many thousands of Lepidoptera have been collected in these islands and we are disposed to think that *Delias* are absent together with their food-plant *Loranthus*. The possibility still remains that some *Delias* may exist in the mountains in the interior of Great Key, should more open country occur there. We know only 11 species of *Pieridae* from the Key Islands and all belong to common species found chiefly in the Moluccas. Few specimens were received and they do not appear to be common.

In the neighbouring Aru Islands only 3 species of *Delias* are known, and further south in the Tenimber group only one species is known. On the Schouten Islands, which are nearer the New Guinea mainland, 7 species are known. On New Guinea 66 distinct species are found out of a total of 155 species known in the genus (over 42 per cent.). These species are differentiated into 131 forms, and with a few exceptions these are geographical. It is extremely probable that many more remain to be discovered on the still unexplored mountains of New Guinea. Only a few of these species occur in the lowlands, and these are the only ones with representatives outside New Guinea.

In contrast to the 7 species found in the small Schouten Islands to the north of New Guinea, the large island of Celebes has also only 7 species on record. Further discoveries must be looked for here.

The allied genus *Huphina* has an equally wide range over the same area as *Delias*, but only about 20 species are known. These insects occur chiefly in the lowlands.

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The most interesting phenomenon in the distribution of *Delias* in New Guinea is the occurrence of many distinct species at one place. At the Angi Lakes in the Arfak Mountains, the collectors Pratt obtained 22 distinct species, or a third of the New Guinea species. According to Jordan (*Nov. Zool.*, xviii, p. 511, 1911): "This specific distinctness has come into existence in geographically separate districts."

Analysis of the Species found in each Area (obviously allied Areas are grouped together).

WESTERN AREA.

1. *China, Tibet, Yunnan, Hainan, Formosa.*—9 species occur, of which 2 are endemic, 1 reaches the Philippines and 6 occur in India and Burma.
2. *India, Ceylon, Andamans, Burma.*—11 species occur, of which 2 are endemic and 6 reach the area of Tenasserim and the Malay Peninsula.
3. *Tonkin, Annam, Siam, Cochin China.*—9 species occur, of which 7 are found in Tenasserim and the Malay Peninsula.
4. *Tenasserim, Mergui, Malay Peninsula.*—10 species occur.
5. *Sumatra, Mentawej Islands, Nias, Batu, Riu Lingga Islands, Banka, Billiton.*—10 species occur, of which 7 are found in the Indian area and 4 in Java.
6. *Java, Bali, Lombok, Bawean, Kangean.*—10 species occur, of which 2 are endemic, 4 are found in Sumatra and 4 in the Sumbawa area.
7. *Sumbawa, Sumba, Flores, Pura, Adonara, Alor.*—5 species occur, of which 1 is endemic (Sumba) and 4 are found in Java.
8. *Borneo.*—9 species occur, of which 1 is endemic, 6 reach the Indian area and 4 are found in the Philippines.
9. *Philippines* (including *Palawan, Jolo, Sulu*).—11 species occur, of which 5 are endemic, 4 reach the Indian area, 4 are found in Borneo and 2 in Celebes.
10. *Celebes, Banggai, Sula, Saleyer.*—9 species occur, of which 6 are endemic and 3 reach the Indian area.

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CENTRAL AREA.

11. *Halmaheira, Batjan, Obi, Morotai.*—7 species occur, of which 1 is endemic in Halmaheira and 1 is common to this island and Buru. All the species occur in Halmaheira, whilst Batjan and Obi have 4 each.
12. *Gebi Island.*—A species found on Waigeu and New Guinea reaches this island.
13. *Buru.*—10 species occur, of which 6 are endemic, 2 are found in the Ceram area, 1 in Halmaheira and 1 in Timor.
14. *Ceram, Amboina, Goram.*—9 species occur, of which 8 are endemic and 2 are found in Buru.
15. *Timor, Roma, Babber, Dammer, Moa, Wetter.*—4 species occur, of which 1 is endemic, 1 reaches the Indian area, 1 is found in Buru and 1 in Tenimber.
16. *Tenimber Islands.*—Only a single species, which occurs in Timor and the intervening islands.
17. *Aru Islands.*—3 species occur, of which 2 are endemic and 1 reaches Australia and New Guinea. The 2 endemic forms are more nearly related to forms found in the Schouten Islands, and through these to Moluccan types.

EASTERN AREA.

18. *Australia.*—8 species occur, of which 4 are endemic and 4 are found in the New Guinea area.
19. *Mysol.*—3 species occur and all are found in New Guinea.
20. *Waigeu, New Guinea and its Satellite Islands.*—68 species occur, of which 62 are endemic, 4 reach Australia and 1 is common to Jobi and Biak only.
21. *Schouten Islands.*—7 species occur, of which 6 are endemic and the other is found in Jobi. The endemic species comprise 5 allied to Moluccan forms and 1 to a New Guinea species.
22. *Bismarck Islands.*—7 species occur and all are endemic. Their affinities are probably 4 with New Guinea forms and 3 with Moluccan.
23. *Solomons.*—Only 2 species known and both are endemic. Apparently 1 is related to a Moluccan species and the other to a New Guinea one.

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TABLE I.

x = New Guinea Group.

	Species Groups																			
	1	2	3	4	5 x	6 x	7 x	8 x	9 x	10 x	11	12	13	14 x	15 x	16 x	17	18	19	20	Total
WESTERN AREA :—																					
China	..	..	..	..	..	..	..	..	..	..	..	4	2	..	..	..	..	..	..	1	7
Formosa	..	..	..	..	..	..	..	..	..	..	..	2	1	..	..	..	..	..	..	1	4
Hainan	..	..	..	..	..	..	..	..	..	..	...	..	1	..	..	..	..	..	..	1	2
Tibet	..	..	..	..	..	..	..	..	..	..	..	5	2	..	.	..	..	..	..	..	7
Yunnan	..	..	..	..	..	..	..	..	..	..	..	4	1	..	..	..	..	..	..	..	5
India	..	..	..	..	..	..	..	..	..	..	..	3	2	..	..	..	1	1	..	2	9
Ceylon	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
Andamans	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	2
Burma	1	..	..	..	..	..	..	..	..	..	..	3	2	..	..	..	1	1	..	1	9
Tonkin	..	..	..	..	..	..	..	..	..	..	..	2	2	..	..	..	..	1	..	1	6
Siam	2	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	1	1	..	1	7
Annam	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	1	..	1	4
Cochin China	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	1	3
Mergui	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1
Tenasserim	1	..	..	..	..	..	...	..	..	..	..	1	2	..	..	..	1	..	..	1	6
Malay Peninsula	1	1	..	..	..	..	..	..	..	..	..	..	3	..	..	..	1	1	..	1	8
Sumatra	..	2	..	..	..	..	..	..	..	..	..	1	3	..	..	..	1	1	..	1	9
Mentawej	..	..	..	..	..	..	.	..	..	..	..	..	..	..	..	..	..	..	..	1	1
Nias	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	2
Riu Lingga Islands ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
Batu Islands ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
Java	..	2	..	..	..	..	..	..	..	..	..	..	2	..	..	..	1	1	..	2	8
Bawean	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	2
Bali	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	2	3
Kangean	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	2
Banka	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	2
Billiton	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	2
Borneo	1	2	..	..	..	..	..	..	..	..	..	..	3	..	..	..	1	1	..	1	9
Philippines	1	2	..	..	..	..	..	..	..	..	..	..	3	..	..	..	3	1	..	1	11
Jolo and Sulu	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
Palawan	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	1	3
Lombok	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	2	3
Sumbawa	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	2	4
Sumba	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
Flores	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	2
Pura	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	2

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Adonara	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1
Alor	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	2
CENTRAL AREA :—																							
Celebes	1	1	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	1	1	..	1	7
Saleyer	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
Banggai	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	2
Sula Islands	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Halmaheira	..	1	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	2	1	7
Morotai	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
Gebi	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1
Batjan	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	1	4
Obi	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	2	1	4
Buru	3	..	1	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	2	1	1	10
Amboina	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	2	1	1	6
Ceram	2	..	1	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	3	1	1	10
Goram	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
Timor	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	2	..	1	4
Wetter	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
Roma	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	2
Moa	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
Babber	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
Dammer	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
Aru	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	3
Tenimber	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
EASTERN AREA :—																							
Australia	1	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	3	..	1	2	8
New Guinea	2	2	1	17	4	5	4	5	7	2	..	..	2	7	2	1	2	1	2	1	2	66
Mysol	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	3
Waigeu	2	1	..	..	..	..	..	..	..	1	..	..	..	..	..	1	1	1	1	1	1	8
Rossell	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	1	1	1	4
Sud-Est	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	1	1	1	1	5
St. Aignan	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1
Fergusson	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	1	4		
Goodenough	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	1	4		
Kirwina	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1		
Yule	..	1	..	..	..	..	..	..	..	..	..	..	1	..	..	1	1	..	1	5		
Ron	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1		
Jobi	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	2		
Mefor	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	3		
Schouten Islands	1	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	2	1	7		
Bismarck Islands (five)	..	1	..	..	..	..	..	..	..	1	..	..	..	..	..	1	1	1	2	7		
Solomons (three)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	2		
Total of areas = 76 ..	9	19	9	3	1	1	1	1	1	12	10	25	2	1	1	34	26	16	65	..		

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TABLE II. (The species are numbered as in the order of the list.)

Species	Eastern Area	New Guinea	Central Area	Western Area	Species Group
1	..	..	..	x	1
2	..	..	..	x	1
3	..	..	..	x	1
4	..	..	x	..	1
5	..	..	x	x	2
6	..	..	..	x	2
7	..	..	x	..	2
8	..	..	x	..	2
9	..	..	x	..	2
10	..	..	x	..	2
11	..	..	x	..	2
12	..	..	x	..	2
13	..	..	..	x	2
14	..	..	..	x	2
15	x	..	..	..	2
16	..	..	x	..	2
17	x	..	..	..	2
18	x	x	..	..	2
19	x	x	..	..	2
20	..	..	x	..	3
21	x	..	..	..	3
22	x	x	..	..	3
23	..	x	..	..	3
24	x	..	..	..	3
25	x	..	..	..	3
26	..	..	x	..	4
27	..	..	x	..	4
28	..	x	..	..	4
29	..	x	..	..	5
30	..	x	..	..	5
31	..	x	..	..	5
32	..	x	..	..	5
33	..	x	..	..	5
34	..	x	..	..	5
35	..	x	..	..	5
36	..	x	..	..	5
37	..	x	..	..	5
38	..	x	..	..	5
39	..	x	..	..	5
40	..	x	..	..	5
41	..	x	..	..	5
42	..	x	..	..	5
43	..	x	..	..	5
44	..	x	..	..	5
45	..	x	..	..	5
46	..	x	..	..	6
47	..	x	..	..	6
48	..	x	..	..	6
49	..	x	..	..	6
50	..	x	..	..	7
51	..	x	..	..	7
52	..	x	..	..	7
53	..	x	..	..	7
54	..	x	..	..	7
55	..	x	..	..	8
56	..	x	..	..	8
57	..	x	..	..	8
58	..	x	..	..	8
59	..	x	..	..	9
60	..	x	..	..	9
61	..	x	..	..	9
62	..	x	..	..	9
63	..	x	..	..	9
64	..	x	..	..	9
65	..	x	..	..	10
66	..	x	..	..	10
67	..	x	..	..	10
68	..	x	..	..	10
69	..	x	..	..	10
70	..	x	..	..	10
71	..	..	x	..	11
72	x	x	..	..	11
73	x	..	..	..	11
74	..	..	x	..	11
75	x	..	..	..	11
76	..	..	x	..	11
77	..	..	x	..	11
78	x	..	..	..	11
79	..	..	x	..	11
80	..	..	..	x	12
81	..	..	..	x	12
82	..	..	..	x	12
83	..	..	..	x	12
84	..	..	..	x	12
85	..	..	..	x	12
86	..	..	x	x	12
87	..	..	x	..	12
88	..	..	..	x	13
89	..	..	..	x	13
90	..	..	..	x	13
91	..	..	..	x	13
92	..	..	..	x	13
93	..	..	..	x	13
94	..	x	..	..	14
95	x	x	..	..	14
96	..	x	..	..	15
97	..	x	..	..	15
98	..	x	..	..	15
99	..	x	..	..	15
100	..	x	..	..	15
101	..	x	..	..	15
102	..	x	..	..	15
103	..	x	..	..	16
104	..	x	..	..	16
105	..	..	x	x	17
106	..	..	..	x	17
107	..	..	..	x	17
108	..	..	x	..	17
109	..	..	x	..	17
110	..	..	..	x	17
111	x	..	..	..	17
112	x	x	..	..	17
113	..	..	..	x	17
114	..	..	..	x	17
115	x	..	..	..	17
116	x	..	..	..	17
117	..	..	..	x	18
118	..	..	x	..	18
119	..	..	..	x	18
120	..	..	x	..	18
121	..	..	..	x	18
122	..	..	x	..	18
123	..	..	x	..	18
124	..	..	x	..	18
125	..	..	x	..	18
126	..	..	x	..	18
127	x	..	..	..	18
128	..	..	x	..	18
129	x	..	..	..	18
130	x	x	..	..	18
131	..	x	..	..	18
132	x	..	..	..	18
133	..	..	x	..	19
134	..	..	x	..	19
135	..	..	x	..	19
136	x	..	..	..	19
137	x	x	..	..	19
138	x	..	..	..	19
139	x	..	..	..	19
140	..	..	..	x	20
141	..	..	..	x	20
142	..	..	x	..	20
143	..	..	x	..	20
144	..	..	..	x	20
145	..	..	..	x	20
146	..	..	..	x	20
147	..	..	x	..	20
148	..	..	x	..	20
149	..	..	x	..	20
150	x	x	x	..	20
151	x	..	..	..	20
152	x	..	..	..	20
153	x	..	..	..	20
154	x	..	..	..	20
155	x	x	..	..	20
Total of Species	31	65	39	34	

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We have grouped these various areas into three larger ones as follows: *Central Area*, containing Groups 10-17; *Western Area*, containing Groups 1-9; *Eastern Area*, containing Groups 18-23. These areas are arranged in Table I which illustrates the number of species belonging to each group of species which occur in each small area and similarly in the larger areas. It further shows how many areas are occupied by each group of species. The table illustrates the universal distribution of the *Piccarda* (Group 20) species which occurs in 65 out of the 76 areas, and the wide range occupied by Groups 13, 17, 18. If it be admitted that size of area is an indication of age, it may, perhaps, be assumed that *Piccarda* was ancestral to other groups, and that the *dorimene* and *belisama* groups were afterwards evolved.

In Table II we illustrate the occurrence of each species in the three large areas as well as in New Guinea.

It is observed that 54 species are found only in New Guinea, 41 only in the Central Area, 21 only in the Western Area, and 21 in the Eastern Area excepting New Guinea. There is a total of 18 species which occur in more than one area. No species occurs in all four areas, but species 150 (= *mysis*) occurs in the Eastern, New Guinea, and Central Areas.

In contrast to *Huphina* and indeed to all other Pierines distributed over the same area, the genus *Delias* is remarkable for its large number of species, and we conclude that it has been more subject to variation and is less stable than genera which accompany it. There are wide gaps between many of the species and either these have been isolated for a considerable time or further discoveries of allied species are to be made. As the area of most species is shown to be of limited extent and not often encroaching upon the area of another species, it would seem that the distribution and evolution of this genus must have occupied a very considerable time.

With the exception of the group of *Delias* represented by entirely alpine New Guinea forms, all other groups are represented by species occurring in the Central Area. It seems reasonable enough to suppose that many species originated in this area and spread in all possible directions.

The greater number of endemic species occurs in New Guinea, this island having 54 such species. The existence of a high mountain system is the chief cause of this remarkable number of distinct species. It is not the only cause, as China and India possess a still greater mountain system, but only produce 2 endemic species. Here probably the farther northern latitude, where mountain valleys are much colder

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for a great part of the year, is detrimental to the production of a very rich species fauna, especially in genera which have had a tropical origin. In the other mountain regions farther south the production of endemic forms is very apparent. In Ceram, where the elevation is over 6,000 feet, we find 8 endemic species; in Buru 6, Celebes 6, and the Philippines 5. The peculiar species found in the Schouten, Bismarck and Solomon Islands is perhaps more the result of long isolation.

Very few species have a very wide range. *D. hyparete* and *aglaia* extend from China to the Philippines and Bawean. *D. mysis* extends from Aru to Australia and the New Guinea area. *D. aruna* extends from the Moluccas over the New Guinea area. *D. descombesi* extends from Sikkim to Timor, and *belladonna* from China to Celebes, but it is not yet found in Borneo. *D. gabia* is found over the whole New Guinea region, and *ennia* has a similar range including N. Australia. The other species have a much more restricted range, and 40 of them are only found each in one island. About 60 per cent. of the known species are definitely restricted to one area.

7.—Habits.

These butterflies frequent grass country and open woodland, and most species occur from 2,500 feet upwards to 8,000 feet, rarely to 10,000 feet. They haunt flowering trees and shrubs. The females are often difficult to obtain as they hover around places far out of reach of the net, but at some time during the day, generally late in the afternoon, they descend to the ground. On the mountains in Central Ceram at 6,000 feet, the brothers Pratt were forced to erect platforms on the trees frequented by the insects, and, with long-handled nets, catch them as they came within reach. They often remain on the same bush where they have emerged from the pupa.

The larva feeds on Mistletoe (*Loranthus*) with few exceptions so far as is known. They are gregarious on the undersurface of the leaf. The early stages of only a few species are known.

Dr. A. R. Wallace (*Trans. Ent. Soc. Lond.*, iii, iv, p. 344, 1867) remarks: "They all fly weakly and slowly, yet they are by no means rare, since in almost every locality I found some of the species very abundant in the forests, flying lazily along near the ground, sometimes settling on a flower, but more generally seeming to wander aimlessly through the pathless recesses of the forest. It is probable, then, that they have some special protection which renders swiftness of motion

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and the disguise of sombre colours unnecessary, and this seems the more probable when we find that some of them are the subjects of mimicry."

8.—Migration.

Poulton, *Proc. Ent. Soc. Lond.*, 1920, p. lxiii.

After what has been said on the distribution of Delias, it is not surprising to find that migration is very unusual in this genus although it is common in some other genera of *Pieridae*. The only record known to us is of a migration over a very small area, and as in this case the individuals returned to their starting point, this migration is only an illustration of the instinct.

Professor Poulton, in the note quoted above, has treated of some observations made by Mr. A. R. Sanderson at Bukit Kutu in Selangor. *Delias ninus* and *D. pyramus*, accompanied by moth mimics, were seen migrating in the evening from one valley to another, and returning in the early morning. This phenomenon was observed every day from March 4 to March 13. Whether it was continued later is not known.

9.—Mimicry.

F. A. Dixey.—On Mimicry in certain Butterflies of New Guinea, *Trans. Ent. Soc. Lond.*, 1918, pp. 118-129.

The Geographical Factor in Mimicry, *Trans. Ent. Soc. Lond.*, 1920, pp. 208-211, pl. vi.

Several species of *Delias* possess a mimetic hind wing underside pattern which is reproduced in a general way by certain species of the Pierine genera *Huphina* and *Prioneris*, and by the Nymphaline genus *Mynes*. These species are dealt with by Dr. F. A. Dixey in the two papers quoted above, and in the second paper an excellent coloured plate illustrates the principal resemblances.

Some species which have not a mimetic hind wing underside pattern are mimicked in their pattern of the upperside.

To the mimetic genera mentioned above are to be added *Ixias* and *Appias* (Pierines), *Elymnias* (Satyrid), and *Cyclosia* (Zygaenidae).

In Dr. Dixey's first paper (1918), the question as to whether *Huphina abnormis* and *euryxantha* were conspecific is left undecided. In the Hill Museum there are specimens of both these forms taken in the same particular locality, from several parts of New Guinea. It looks as though there were 2 species, yet there is still the possibility

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that this one is a dimorphic species. Considering the peculiar scent-scale of these 2 forms, one is inclined to think that they represent the ancestral *Huphina* stock, and that *abnormis* is more specialized than *euryxantha*.

Following is a list of the mimetic species and the presumed mimics which resemble them. It may perhaps be extended by future researches.

ornytion G. & S. ... ... / *aruna irma* Fruh. ...	*Huphina abnormis* Wall. ... / *Mynes geoffroyi* f. *doryca* Butl.	New Guinea.
splendida Roths. ... ... / *eileenae* J. & T.	*Huphina laeta* Hew. ...	Timor.
descombesi oraia Doh. ... / *sambawana* Roths. ...	*Huphina temena* Hew. ...	Lombok, Sumbawa, Flores.
fasciata Roths.	*Huphina julia* Doh. ...	Sumba.
eucharis Drury	*Prioneris sita* Feld. ...	India, Ceylon.
belladonna Fbr. races ...	*Prioneris thestylis* Doubl....	N. India, Yunnan, Burma to Malacca.
wilemani Jord.	*Aporia agathon moltrechti* Ob.	Formosa.
singhapura indistincta Fruh.	*Prioneris cornelia* Voll. ...	Borneo.
blanca nausicaa Fruh. ...	*Huphina pactolica* Butl. ... / *Prioneris cornelia* Voll. ... / *Ixias pyrene undatus* Butl. ♀ ... ... / *Appias cardena* Hew. ...	Borneo.
crithoe tobahana Rogh. ...	*Prioneris hypsipyle* Weym.	Sumatra.
Do. with hind wing above	*Elymnias esaca pseudo-delias* Fruh.	Sumatra.
crithoe Bdv.	*Prioneris autothisbe* Hbn... / *Elymnias makeswara* ...	Java.
mysis Fbr. races	*Huphina euryxanthe* Honr. / *Appias ada thasia* Fruh. ...	New Guinea.
henningia pandemia Wall. / *georgina cinerascens* Mitis.	*Cyclosia pieroides* Walk. ♀	Borneo.
aglaia egialea Cram. ...	*Cyclosia pieroides* ♀ ... / *Prioneris autothisbe* Hbn...	Java.
totila Heller ... ... / ♂ upperside, fore wing ...	*Mynes katharina* Ribbe ♀ form	New Ireland.
totila ... ... / ♀ upperside, fore wing ...	*Mynes katharina* ♀ ...	New Ireland.
bagoe Bdv. ... ... / Upperside, fore wing ...	*Mynes eucosmetos* G. & S....	New Ireland.

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salvini Butl. ... ... Upperside, fore wing ...	*Mynes eucosmetos cottonis* H. G. Smith	New Britain.
dohertyi knowlei J. & N. ♀	*Mynes geoffroyi* f. ... ... *aureodiscus* J. & T....	Schouten Islands.
nigrina Fbr. ♀ ... ... Upperside...	*Mynes geoffroyi guerini* Wall.	Australia.
duris Hew. ♀ ... ... Upperside...	*Mynes doubledayi* Wall. ♀	Ceram.

We have not included cases of less definite resemblances which may or may not be more definite on the wing. One instance must be mentioned as it is quoted under "Migration." The association on the wing of *Delias ninus* and *thysbe pyramus* with *Dysphania glaucescens* Walk., *D. militaris* f. *selangora* Swinh. (Geometrids), and *Psaphia camadeva* Doubl. (Zygaenidae), is said to represent a Müllerian combination.

A certain amount of mimetic resemblance occurs within the genus. In Borneo we have *D. henningia pandemia*, *aglaia angustifascia*, and *ninus parthenia*. These all have a similarly patterned hind wing underside, and the *pandemia* and *parthenia* show a large yellow patch on the hind wing above. It must be remembered that mimicry is not necessary to explain these resemblances on Borneo, because the species belong to the same group of allied forms.

On the Malay Peninsula the same group is represented by *thysbe perakana*, *aglaia parthenope*, and *ninus ninus*, the first and third also with a yellow colouring on part of the hind wing above.

On Buru, the species *dumasi*, *apatela*, and *rothschildi* show a remarkable likeness in the underside hind wing pattern.

On Ceram, the species *echidna* and *schuppi* have the hind wing underside pattern somewhat as in the Buru forms mentioned above.

In northern India, the similarity between *sanaca* and *belladonna* forms is well known, but these are related species.

In the Schouten Islands, out of the 7 species which occur, 6 have the female with a nearly uniformly blackish-coloured upperside, and submarginal spots on both wings in 5 of them. These species belong to four different groups.

The cause of most, if not all, of these assemblages is probably an interchange of species between different geographically distinct areas.

Those species which had not become already too stable would tend to converge in pattern if the factors for mimicry were operative.

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10.—Morphology.

(1) *Larva.*

Differs from the larva of other *Pierinae* in the possession of tufts of long hair which form either a dorsal and two lateral rows or only a dorsal row.

(2) *Pupa.*

Stout, with the head process short or long, bifid or simple. Often three rows of spines corresponding to the larval hairs. Pupal stage usually lasts ten days.

(3) *Imago.*

Wings of moderate size, the fore wing of some species measuring 22 mm. and of others 52 mm. Coloration of the underside of the hind wing never the same as the upperside.

Shape of wings more or less rounded, the fore wing sometimes elongate.

Neuration of fore wing (text fig., p. 3).—Veins 2-4 well separated, 5 from near the upper angle of cell, 6 from beyond the cell, 7 and 9 stalked near the apex, 8 absent, 10 from the cell, 11 absent, 12 free.

Hind wing.—Vein 2 farther from 3 than 3 is from 4, 5 nearer 6 than to 4, 7 from the cell and reaching the apex, 8 free and reaching to before the middle of costa.

Distinguished from the similar genus *Huphina* by a single subcostal vein arising from the cell; in *Huphina* two subcostal veins arise from the cell.

Cell about half length of wing. The upper discocellular usually shorter than the lower. Some variation occurs in the length of these veins in species within the same group.

The presence in the fore wing of two radial veins and the median stalked (=6, 7 and 8, and 9) together with one subcostal from the cell, serves to distinguish this genus from any others except *Pereute*, which is a South American genus, with other characters, not found in *Delias*.

Palpi of the type found in other *Pierinae*, with a long narrow third segment which is about equal in length to the middle segment, rather hairy below. Antenna with a stout club which is grooved.

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(4) *Scent-scales* (pls. xviii-xxxv).

Watson, *Mem. Lit. and Phil. Soc. Man.*, Ser. 3, vol. ii.
Dixey, *Proc. Ent. Soc. Lond.*, 1909, p. cxii.

The male wing of most *Pieridae* bears a patch of androconia or scent-scales. This patch is usually placed on the median discal area of the fore wing, but sometimes occurs on the hind wing. In *Delias* these scales occur in all species, but only on the fore wing. For a description of the *Pierine* scent-scale the student is referred to Dixey (1909). His account of the *Delias* scales is the most important which has been given hitherto, and so we reproduce it here:—

"The lamina is usually large, and more or less tapering towards the distal extremity. The base is generally rounded and the apex filiform, having, with the fimbriae, a really plume-like appearance. The sculpturing of the lamina with a moderately high power looks granular; in several species, notably *D. harpalyce*, *D. gabia* and *D. agostina*, the granular arrangement is modified along the course of the axis, giving the idea of a central core. This may be well defined, as in the first of the species named, or diffused as in *D. aganippe*. The lamina may be called kite-shaped in *D. pyramus*, *D. ninus*, *D. egialea* and other members of the *pyramus* group; pyriform in *D. agostina*; tadpole-shaped in *D. belladonna*. In the *belisama* section the lamina resembles an Indian club reversed; that of *D. indistincta*, from its nearly squared base, is like an elongated champagne-bottle; and similar contours are shown by *D. nysa*, *D. momea*, the *aganippe* and *isse* groups. The scent-scales in these species are mostly very long, in correspondence with the ordinary scales of the wing. They are often abundant, occasionally even seeming to outnumber the ordinary scales, and in common with these latter are, as a rule, easily detached. The disc is usually large, frequently kidney-shaped, and often with the internal chitinous structure especially well marked. In *D. momea* it is exceptionally small; in *D. aruna* it is cocked-hat shaped. In the *pyramus* group there is generally a sharpish median proximal projection. The scales are long in the *belisama* and *aganippe*, comparatively short in the *isse* assemblage. The *pyramus* section in this respect is intermediate."

"There is an important group of Delias, consisting of *D. mysis*, *D. argenthona*, *D. caeneus* and *D. eucharis* with the geographical forms *D. stolli*, *hierte* and *hyparete*, which is marked off from the rest of the genus no less by the character of its plume-scales than by its obvious aspect. The laminae in these species possess the common character

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of a triangle with elongated apex, so that their outline may be compared to that of an inverted funnel or trumpet. In *D. argenthona* and *D. hyparete*, the lamina, from its expanded and rounded base, may perhaps more aptly be termed decanter-shaped. The apex in these species, though narrow, is blunt, and not filiform as in the majority of the species of *Delias*. It is often laterally bent, and may be slightly twisted. The fimbriae, which are rather short, are termino-lateral. The scent-scales in all this group are very much smaller than those of most other members of the genus; the discs are large in proportion, generally rounded, and in some species, notably *D. caeneus*, well displayed in consequence of the straightness of the footstalk."

"As regards their scent-scales, *Delias nigrina* and *D. ornytion* are in some ways transitional between the *eucharis* group and the rest of the genus. Like the former, they have a triangular lamina with a prolonged apex; this, however, is acute though not filiform. The lamina is much larger than in the *eucharis* section, but still below the average size of the genus. A curious feature in *D. ornytion* is the frequent presence, on one lobe only of the somewhat cordate base, of a sharp spur like a rudimentary form of such a spine as occurs in '*Ptychopteryx*' *lucasii*."

"It is perhaps worth mentioning that when I was investigating the genus *Delias* from the point of view of colour-pattern, I was inclined to consider *D. nigrina* as a term in the series leading through *D. harpalyce* up to *D. aganippe*. The evidence of the scent-scales, without contradicting this, seems to indicate an approach on the part of *D. nigrina* to the *eucharis* group, as well as to that with which I formerly associated it; and seems also to show that its affinity with *D. ornytion* is closer still."

The basal disc varies much in size, ranging in diameter from ·013 mm. to ·05 mm. in one species. A disc of a certain size is often characteristic of a group of species. In Groups 1-12 of our arrangement the disc is small to moderate except in one species allocated to Group 12 which has a disc exceeding all others in the genus. In Groups 13-20 the size of the disc is greater than in the others.

There are four types of scent-scales in *Delias*: (1) Flask-shaped, with a small disc (Group 11). (2) Flask-shaped, with a large disc (Group 19). (3) Flask-shaped, with a large disc and a rather broad neck (Group 20). (4) A longer scale than the others, the neck rapidly tapering (remaining groups). Group 18 has a scale which is still somewhat flask-shaped and is apparently allied to Group 19.

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Most species can be easily recognized by the form of the scale, though in some groups (11, 13, 17, 19,) specific differentiation is slight.

Dixey, l.c., p. cxxi, remarks that "The scent-scales in *Huphina* at once recall those of *Delias*, from which they can scarcely be distinguished except by the comparative smallness of their accessory discs."

Mr. F. Ball makes the following remarks in one of his communications to the author :—

Speaking of Group 1, "By the androconia there is no reason to separate this group from the next as the scales are practically identical and only offer minor specific variations."

Group 3.—"In this group *chrysomelaena*, *totila*, *talboti*, *caliban* and *ladas* go well together and seem quite distinct specifically."

Group 4.—"The scales of this group are identical with those of the next."

Group 6.—"This very characteristic group bearing long, narrow scales with an extremely minute disc, contains four well differentiated species."

Group 7.—"The five following species and their varieties seem well placed: *castaneus*, *pratti*, *caroli*, *bornemanni* and *nais*."

Groups 8, 9 and 10, "Are very near to one another."

Group 11.—"A most interesting group with very small scales bearing minute discs. It is remarkable that several species of this group, now admitted on all hands to be *Delias*, were for long treated as forms of *Huphina*, in which genus *abnormis* is still generally classed, although its scales scarcely differ, except by their rather smaller size, from those of *D. joiceyi* and *prouti*. These in turn are little removed from *duris*, *funerea* and *dohertyi*, gradually increasing in width through *eximia*, *ornytion*, and *nigrina* to *persephone*, the latter being probably a distinct species and not a form of *ornytion* as it has been considered."

Group 12.—"Although for other reasons this has been retained as one group, the androconia are of three distinct types, which would authorize a further division into three sub-groups. *D. patrua*, *lativitta* and *eschatia* (if it can be admitted here) have long conical scales with rather straight sides and somewhat small disc. *D. sanaca*, *perspicua*, *subnubila*, *wilemani*, *berinda*, *adelma* and *boyleae* have scales more tapering, broader near the base and with incurved sides and extremely small discs, all very uniform. *D. belladonna horsfieldi*, *zelima*, *ithiela*, *lugens*, *hedybia* and *chrysorrhoea* have much shorter scales still broader at the base, still more incurved laterally, and with decidedly large discs. As for *benasu* the disc is enormous. This scale is quite unlike that of any other *Delias* and does not seem to belong here at all."

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Group 13.—"This is a very homogeneous group, the species differing only very slightly in the length and breadth of the scale."

Group 14.—"This group only contains three species, *albertisi*, *discus* and *mira*."

Group 15.—"We have not seen scales of *inexpectata* nor of *klossi*, but *elongatus*, *clathrata*, *catocausta*, *mariae* and its form *menooensis* seem to have considerable affinities."

Group 16.—"Only contains two species which, however, have very distinct and characteristic scales, *meeki* and *niepelti*. *D. arfakensis* has a scale identical with *niepelti*, of which it might be a form, otherwise it had better be treated as a separate species; the scales are too different for it to be a form of *meeki*."

Group 17.—"So uniform are the scales of this group that it is hard to appreciate the distinctions of the species. Those of the nine recognized species, *descombesi*, *belisama*, *zebuda*, *madetes*, *aruna*, *diaphana*, *ellipsis*, *aganippe* and *eumolpe* are extremely similar; very easily separated from those of any other group. *D. harpalyce* differs too much to be brought in here, it seems to come well in Group 10."

Group 18.—"Here too the scales are singularly constant, though there is somewhat more difference between the species than in the last groups."

Group 19.—"We now come again to some very small scales, but this time with large discs and distinctly broadened plumes; on the whole wonderfully uniform, the group having almost subgeneric value. *D. icre* and *nigidius* probably deserve specific distinction; they can hardly be forms of *ennia*."

Piccarda.—"This is a very characteristic genus having scales quite different from those of *Delias*. The sixteen species it contains seem very well established and distinct, and the attribution of the various forms is quite confirmed by the examination of the androconia, the indications of which agree completely with the deductions from the other characters."

The scales of the following species differ much from the others in the groups in which they are placed. *D. sagessa*, *eschatia*, *harpalyce*, *fruhstorferi* and *manuselensis*. Mr. Ball suggests that *sagessa* should go into Group 10 (*kummeri*), *fruhstorferi* and *manuselensis* into Group 8 (*iltis*), *eschatia* into Group 12 (*belladonna*), and *harpalyce* into Group 10 (*kummeri*).

On the characters afforded by pattern and genitalia, we cannot conceive how the above species can be related to the groups suggested.

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And if it be taken into account that the scales of *Huphina abnormis* are very like those of the *nigrina* group, it is evident that the scent-scales are like other structures which by themselves cannot indicate true relationship, but which often indicate parallel lines of development.

(5) *Internal Structure.*

The genitalia are of the *Pierine* type and of quite simple construction.

Valve (pl. viii-xvii).

The valve is triangular and of variable size, very broad posteriorly as a rule. The ventral edge is longer than the dorsal edge and is usually not rounded. The dorsal edge is sometimes straight but is usually rounded with a more or less conspicuous convexity posteriorly. The apical or distal edge is narrowed and of varying form. It may be broad and rounded or narrow and rounded, or conical and rounded or obtuse, or with a process of varying form which is usually directed proximad, but in some cases is directed distad. This process attains its greatest length in *sagessa* and in this species the valve is unlike that of any other. The rounded type of valve is typical of the group *Piccarda* and of the *aglaia* and most of the *belladonna* group. A curious feature in a group of New Guinea and allied species is the strongly excavated dorsal edge below the apex. A modification of this type is represented by the *stresemanni* group.

Many species possess a curious structure on the middle basal region of the valve. This consists of a rounded hole or groove in the membranous lining. Close to this on the membrane at one side is a short flap or tubercle which is directed towards the groove and sometimes overlays it. The size of the hole and the shape of the flap vary in different species, and many species are quite without this organ. A description of this structure in the *belladonna* group is given by Jordan in *Nov. Zool.*, xxxii, p. 280, 1925. An approach to this structure as seen in *belladonna* is found in *Aporia*. In *Huphina* this organ is less like the *Delias* type.

Uncus (pl. i-v).

The uncus is formed of three lobes in most species but in some only one lobe is present. Sixteen structural types can be recognized, and these can be assembled to form nine distinct groups.

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Group 1.—Three lobes of equal length or the central lobe longer than the outer ones, sometimes rather broad.

A. Lobes of moderate size, not narrow, the middle lobe well separated from the outer ones. (Figs. 40-43, 79-89, 130-149.)

B. Lobes of moderate size. Middle lobe well separated from the outer ones and generally longer. The outer lobes usually curved inwards and are rarely very short. (Figs. 28, 29, 60, 61, 62, 64, 65, 74-78.)

C. Lobes long and finger-like, of nearly equal length, the outer ones directed outwards. (Figs. 20, 21, 26, 27, 51, 63, 116, 123.)

D. Middle lobe of moderate length, the outer ones very broad, short and strongly curved, each bearing a small proximal process. (Figs. 66-70, 72, 73.)

E. Similar to D but with no process on the outer lobes. (Figs. 13, 71, 89, 103-107, 109, 110.)

F. Middle lobe longer than the others, short and broad. Outer lobes rather short and strongly curved. A broader and more rounded type than D. (Figs. 52, 58, 59.)

G. Middle lobe long or short and broadly triangular, the outer ones very short and somewhat rounded. (Figs. 25, 30-39.)

Group 2.—Three lobes, the middle one very short and triangular. Outer lobes very large, broad and rounded and strongly curved inwards. (Figs. 14, 15, 17-19, 24.)

Group 3.—Three lobes. Middle lobe usually rather short and obtuse. Outer lobes formed by a short and rounded lateral extension of the tegumen not extending above the middle lobe. (Figs. 49, 50, 53-57, 101, 102, 108, 111, 112-115, 117-122, 124-129, 150.)

Group 4.—Three lobes, outer ones broad with rounded distal edge, and flexed inwards. Middle lobe strongly curved inwards and pointed (claw-shaped). (Figs. 97, 98, 99, 100.)

Group 5.—Three lobes, the middle one smaller and shorter. A very broad type. (Figs. 1-3.)

Group 6.—Three lobes and two accessory ones. The additional lobe is placed below the base of the outer lobe. Not such a broad type as Group 5. (Figs. 4-12, 16.)

Group 7.—A single lobe, long and curved, excavated below the narrowed apex to form a short lip, so that the apex may be said to be bilobed. (Figs. 44-48.)

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Group 8.—Tegumen moderately broad, rounded at the apex owing to the short outer lobes being fused with it. A short narrow middle lobe which is only free anteriorly. (Fig. 23.)

Group 9.—A single curved lobe, variable in width, tapering strongly at the apex. (Figs. 22, 90-96.)

The typical *Delias* uncus is represented by Group 1 and is present in 14 of the 20 groups into which we have divided the genus. The following *Delias* groups are probably closely allied to one another: Groups 1 and 2 (with uncus belonging to Group 5), 3, 4, 5, 6 (with uncus Group 1), 14, 15 (with uncus Group 9), 17, 18, 19 (with uncus Groups 1 and 3).

The primitive form of uncus in *Delias* appears to be the single lobe because this type is general in the allied genera. In *Aporia* it is shorter and broader than in *Huphina*, and is shortly bilobed. This type occurs in *Delias lecerfi*, *elongatus*, *mira*, and other New Guinea species. A further development of this type, with the apex bilobed, is characteristic of the *bornemanni* group. The outer lobes begin to develop in several New Guinea species as exemplified in *heroni*.

Most species have the middle lobe longer than the outer ones. The outer lobe is a special development, and is sometimes accompanied by a small accessory lobe or process. This accessory lobe may be homologous to the outer lobe in most others, where it is a definite prolongation from the same base-level as the middle lobe. The outer lobe in the presence of an accessory lobe would represent a simple lateral extension of the tegumen as seen in *descombesi* (Group 3). The uncus of this group may conceivably have descended from a form with a broad middle lobe.

The complete development of the outer lobes is seen in most species, and *Piccarda* is typical of this. A further development of the outer lobes, in which they are much larger than the middle one, is exemplified in *talboti*, *ladas*, *caliban*, *totila* and some others.

A specialized type, in which the middle lobe is reduced and the two outer lobes fused together, is seen in *sagessa*, and the *niepelti* group exhibits a curious form in which the middle lobe is claw-shaped.

♀ *Genitalia* (pl. vi-vii).

We are concerned only with the *bursa copulatrix*. In many genera, but not in all, of *Pieridae*, there exists on the bursa sac a chitinized dentate plate of very variable form and occupying different positions in different genera. In *Delias* this plate is found near the lower or larger

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end of the sac, but in the allied *Huphina* it is placed near the neck or entrance to the bursa, and in *Aporia* it is placed about the middle. This curious organ has been noticed by various entomologists in a casual way from 1864 onwards. The first descriptive account was given by Hagen (1882), and he assumed that these plates served for tearing open the spermatophores. Stitz (1900-1901) also described these structures and gave them the name of *laminae dentatae*. Petersen (1905) dealt with these structures in various groups, including the genus *Pieris*, and found that the *lamina dentata* was very distinct in each species examined.

The same observation will apply to *Delias*. The forms classified by us as species have quite different forms of the *lamina dentata*; but in the less differentiated geographical races those structures are very similar. We find that this bursal plate is placed either on the outside of the sac or on its inside, but the change of position is probably connected with changes in the development of the various organs, and if the purpose of the *lamina dentata* is to open up the spermatophores, the proper position for it is on the inside.

The form of the *lamina dentata* in *Delias* is a single plate which is usually long and narrow and constricted at the middle. The armature of teeth is confined to the distal areas and never occurs on the middle area of the plate. These teeth project distad. They are usually numerous but are sometimes very few. The outer and more or less rounded edge of the plate is often much thickened, and no teeth are found on this thickened edge. The middle or narrow part of the plate is either concave or convex and may be either short or long.

The groups into which we have divided the genus have no distinctive form of *lamina* with the exception of *Piccarda* and the *belladonna* group. In the former group the plate is large and broad, and there is a comparatively broad central area on either the anterior or posterior margin which does not bear any teeth. In the *aglaia* and *descombesi* groups the *lamina* is narrow, and the posterior margin is either without teeth or is furnished with 2 or 3. This character occurs, however, in other groups but is more usual in the two groups mentioned.

In the *belladonna* group the *lamina* is very large and square, with rather thickened distal edges. It is not armed with many teeth except near the anterior and posterior margins, and these teeth are rather small. This group exhibits the most distinctive form of *lamina* of all others.

If we attempt to arrange the remainder of the forms of the *lamina* into groups we get the most divergent species coming together. As

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with other structures, there is less differentiation in the more ancestral forms, but as new groups of species were evolved these internal structures became altered in such a way that the ancestral type became lost in the development of numerous specific forms. The trend of development is seen in the narrowing of the *lamina*, and the possession of larger teeth.

The drawings are made with the plate in the same position, the anterior margin in the drawing being the margin which faces the entrance to the sac.

11.—Origin and Phylogeny.

F. A. Dixey.—The Phylogeny of the Pierinae. *Trans. Ent. Soc. Lond.*, 1894, pp. 249-334.

To assign the natural position of any genus in its relation to others is always a task of much difficulty and no linear system is possible. The same difficulty is encountered when one attempts to group species according to natural relationship. True conceptions of phylogeny can only be obtained when a thorough knowledge of the biology and distribution of the whole group and its allies is available.

Dr. Dixey, in the memoir quoted above, regards *Delias* and *Prioneris* as having descended from *Metaporia*, and to have spread southwards. The *Metaporia* group is regarded as a relic of the ancient *Pierine* stock represented by the still older genus *Eucheira* in America. We are disposed to agree with this idea of the *Metaporia* origin of *Delias*. We also agree with Dr. Dixey that *Delias* is of great antiquity, and that the forms represented by *D. aglaia* and *belladonna* are the most primitive. These are most likely ancestral to other groups excepting *Piccarda*. The wide distribution of this group is some evidence of its age. Morphologically, *Piccarda* represents a specialized group, and by its scent-scale is allied to the *nigrina* group. However, as the type of scale found in the *nigrina* group is represented in *Huphina abnormis* these structures must be taken in conjunction with others. In the *aglaia* and *belisama* group the scent-scales are not much differentiated, whilst in the *belladonna* group three types of scale are found.

It is an interesting question whether the scale of *Huphina abnormis* represents an ancestral type which has been carried on to *Piccarda* or to the *D. nigrina* group, or whether it represents simply a case of parallel development.

Considering the genitalia of the groups mentioned, a rounded type

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of valve is characteristic of *Piccarda* and the *aglaia* and *belladonna* groups. The two former have also a similar type of uncus. This type of uncus appears in most of the other groups of *Delias*, and the rounded type of valve is characteristic of allied *Pierine* genera. The original *Delias* was probably something like an *Aporia* with light spots on a dark ground. This pattern is probably represented by the pattern of the fore wing in the *belladonna* group. In this group occurs the lighter forms *sanaca sanaca* and f. *flavalba*. Here the dark and the lightest form occur in the same race, and the white *flavalba* is transitional to other *Delias* which have white uppersides.

If we look at the pattern of the hind wing below of these *flavalba* and imagine the submarginal spots to be red, and the other yellow markings to be merged together, we shall get a primitive form of *Piccarda*. On the other hand, if we imagine the yellow spot on the hind wing above in most forms of the *belladonna* group to be red, and on the hind wing below the large and small basal spots to be red, and the distal spots merged together as stripes, we shall have a primitive form of *thysbe* or the *aglaia* group.

It would appear that a *belladonna*-like form having descended from *Aporia* has given rise to *Piccarda* on one side and to *aglaia* on the other.

One may suppose the *Delias* to have originated in an eastern continental Indian area by the extension southwards of *Aporia* forms from the Himalayan system. Some forms representing *Piccarda* and the *aglaia* group spread to the Central Area, where a number of forms arose and the distribution was extended to the Papuan Region. In this Central Area, where conditions were more tropical and life more luxuriant, it may be easily supposed that the development of *Delias* forms proceeded more rapidly than it did in the more northern Western area. At the same time a further distribution was effected of these new forms from the Central Area in all directions, especially westward, and when the Papuan Area became separated whilst the Central and Western areas were still connected, the distinctive New Guinea forms became evolved, and later, after the final separation of the two other areas, some peculiar forms were evolved in the Central Area. The ultimate geographical isolation of these areas and their parts resulted in the development of many new forms in the isolated areas.

So we find that on the evidence of the wing-pattern (as shown by Dixey), of the distribution, and of the morphology, the *Delias* groups

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represented by *aglaia*, *belladonna* and *Piccarda* are older than other groups.

The relationship of the various groups may be conjectured to be somewhat as follows. The *aglaia* stem gave rise to the *nysa*, *singhapura*, and *chrysomelaena* groups. The *Piccarda* stem gave rise to the *nigrina*, *dorimene*, and *isse* groups in one direction, and in another to the *belisama* group. The remaining groups were derived from mountain forms in the Papuan region, and have become so divergent that little can be suggested as to their progenitors. It is probable that Groups 4 to 10 were derived from the *aglaia* stem. Groups 14 and 15 are allied, but the *niepelti* group is more isolated. The position of these three groups is very doubtful.

The group of *belladonna* descended from some *Aporia*-like ancestor which also gave rise to *Huphina*. The *belladonna* group gave rise at one time to *Piccarda* and at another time to the *aglaia* group.

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201.	,, ,, ,, ...	1896, ,, ,, ii, ,, vi.
202.	,, ,, ,, ...	1897, ,, ,, iii, ,, vii.
203.	,, ,, ,, ...	1901, ,, ,, iii, ,, viii, ix.
204.	,, ,, ,, ...	1902, ,, ,, iii, ,, x.
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13.—Systematic.

Delias ... Hübner, 100, p. 91 (1820). Type *egialea* Cram.
Kirby, 120, Suppl., p. 795.
Butler, 7, p. 34 (1870); 8, p. 62; 9, p. 29; 14, p. 143.
Moore, 142, p. 139; 143, p. 163.
Distant, 23, p. 289.
Schatz, 186, p. 63.
Staudinger, 208, p. 34.
Semper, 188, p. 228.
Leech, 123, p. 418.
Mitis, 137, p. 97.
Grote, 82, p. 33.
Bingham, 3, p. 139.

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Delias, contd.		Röber, 169, p. 43.
		Fruhstorfer, 68, p. 123.
Pontia	...	Hübner (nec Fabr.), 100, p. 92.
Pieris	...	Lucas (nec Latr.), 127 (partim).
		Boisduval, 2 (partim).
		Gray, 81 (partim).
		Doubleday and Hewitson, 30, p, 44.
		Moore, 139 (partim).
		Hewitson, 91-94 (1852-62).
		Felder, 46, p. 139 (partim).
		Vollenhoven, 226 (partim).
Thyca	..	Wallengren, 229, p. 76. Type *aganippe* Don.
		Hewitson, 95, p. 97.
		Wallace, 228, p. 344.
		Butler, 6, p. 205 (partim).
		Piepers and Snellen, 161, p. 21.
Piccarda	...	Grote, 82, p. 32. Type *eucharis* Drury.
		Moore, 143, p. 175 (partim).

After its establishment by Hübner in 1820, the genus *Delias* was not used until 1870 when Butler resuscitated it in his "Revision of the Genera of the Sub-family Pierinae" (*Cist. Ent.*, 1, p. 34), and sunk *Cathaemia* and *Thyca* as synonyms.

The first account of the species of *Delias* was given by Wallace in his paper "On the Pieridae of the Indian and Australian Regions" (*Trans. Ent. Soc. Lond.* (3), iv, p. 301, 1867). This author used the name *Thyca*, and described nine species as new, making a list of 57 species. Of these one belongs to *Huphina* and another is a synonym, so that in 1867 only 55 species were known.

Wallace divided the genus into 5 groups: *Pasithoe*, *Belladonna*, *Belisama*, *Hyparete* and *Nysa* respectively. The *Hyparete* group was divided into 6 sections but these do not correspond to our present ideas.

Butler was the next to give an account of this genus in his paper on "A Synonymic List of the Species formerly included in the genus *Pieris*; with all others described since the subdivision of the group by recent authors" (*Proc. Zool. Soc. Lond.*, 1872, p. 26). He employed the name *Delias* and recognized 67 species. Two of these are now synonyms, so that 65 species were known.

No further account of the genus appeared until 1893 when Ritter von Mitis published his "Revision des Pieriden—Genus Delias" (*Iris*,

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vi, p. 97). This is the best account which has been given up to the present day. Mitis catalogues 112 forms of which 10 are described as new; four of these have become synonyms, so that 108 forms were known. He divided the genus into eight groups of which we accept to-day *Aglaia*, *Belladonna*, *Belisama*, *Hyparete* and *Nysa*. Although founded on pattern these appear to be natural groups.

In 1887, *Ann. Mag. Nat. Hist.* (6) 20, p. 143, Butler published a "Revision of the Pierine Butterflies of the genus Delias." In this paper he gives 21 forms which were omitted by Mitis, and recognizes altogether 115 forms composed of 99 species. Eighteen forms are described as new; 3 have become synonyms, so that 112 forms were known to Butler. He however omitted seven forms given by Mitis, and if we take 133 names given by Butler which we accept to-day, the total of forms known in 1897 was 140. Dr. Butler did not divide the genus into groups and neither did he follow the order of arrangement given by Mitis. A number of the forms treated as synonyms by Butler were later restored by Fruhstorfer.

In 1910 the genus was treated by H. Fruhstorfer in Seitz' *Macrolep.*, ix, p. 123, and 231 forms are given. They are divided into 6 groups. These groups are based on the pattern of the hind wing below and constitute rather mixed assemblages. Although no improvement is made on the system of Mitis, the grouping affords a rough key.

At the time of writing, 416 forms of *Delias* are known.

The descriptions which follow are all revised unless otherwise stated. The number following an author's name refers to the bibliographical list where the date and full title are to be found. Unless it is stated to the contrary, all forms have been examined by the author.

LIST OF NAMES TREATED AS SYNONYMS.

acalis Godt. (1819)	...	... =	*thysbe* Cram. (1779).
africanus Kenr. (1911)	...	... =	*albertisi* Ob. (1880).
agelais Godt. (1819)	...	... =	*dorimene* Cram. (1782).
albipictus Goeze (1779)	...	... =	*egialea* Cram. (1777).
aleria Fruh. (1910)	...	... =	*duris* Hew. (1861).
altivaga Fruh. (1892)	...	... =	*dorylaea* Feld. (1865).
angustana Stnd. (1914)	...	.. =	*ennia* Wall. (1867) ♀.
anthyparete Hübn. (1820)	...	... =	*caeneus* L. (1758).
antissa Fruh. (1913)	...	... =	*hempeli* Dann. (1904).
antonoe Cram. (1780)	...	... =	*hyparete* L. (1758).
apriate Hbn. (1820)	...	...	*egialea* Cram. (1777).
avenda Fruh. (1912)	...	... =	*dorimene* Cram. (1782).

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bajura Bdv. (1832) ... ... = *aruna* Bdv. (1832) ♀.
belisar Stgr. (1891) ... .. = *aurantiaca* Doh. (1891).
bicolor Gmel. (1788-91) ... ... = *isse* Cram. (1775).
burmana Evans (1926) ... ... = *hedybia* Jord. (1925).
captorima Van Eecke (1915) ... = *discus* Honr. (1886).
catamelas Stgr. (1891) ... .. = *lorquini* Feld. (1865).
ciris Fruh. (1910) ... ... = *indica* Wall. (1867).
cyrania Fruh. (1913) ... ... = *porsenna* Cram. (1775).
datames Nicév. (1893) ... ... = *hageni* Rogenh. (1892).
derceto Nicév. (1893) ... ... = *tobahana* Rogenh. (1892),
devaca Moore (1872) ... ... = *indica* Wall. (1867).
dione Drury (1773) ... ... = *aglaia* L. (1758).
discors Gmel. (1790) ... ... = *caeneus* L. (1758).
dives Roths. (1904), praeocc. ... *sagessa* Fruh. (1910).
dohertyi Roths. (1894), praeocc. ... = *eileenae* J. & T. (1926).
dorothea Mitis (1893) ... ... = *ennia* Wall. (1867) ♀.
dorothea Tind. (1923), praeocc. ... = *tindalii* J. & T. (1926).
dymas Nicév. (1894) ... ... = *bromo* Fruh. (1893).
elisa Röb. (1919) ... ... = *goda* Fruh. (1905).
emilia Roths. (1904) ... ... = *geraldina* Sm. (1894).
endora Donov. (1805) ... ... = *nysa* Fabr. (1775).
epicharis Godt. (1819) ... ... = *eucharis* Drury (1773).
eurygania G. & S. (1878) ... ... = *bagoe* Bdv. (1832).
formosana Mats. (1909) ... ... = *lativitta* Leech (1893).
fuliginosus Gmel. (1788) ... ... = *dorimene* Cram. (1782).
georgiana Sm. (1895). praeocc. ... = *smithi* Talb. (1928).
hearseyi Butl. (1885) ... ... = *horsfieldi* Gray (1831).
hermione Moult. (1912) ... ... = *cinerascens* Mitis (1893).
herodias Snell. (1898) ... ... = *candida* Voll. (1865) ♀.
hesba Luc. (1852) ... ... = *agostina* Hew. (1852) ♀.
hyparethe Herbst. (1792) ... ... = *eucharis* Drury (1773).
infumata Fruh. (1902) ... ... = *agostina* Hew. (1852) ♀.
insularis Roths. (1925) ... ... = *balli* Hulst. (1923).
joloana Stgr. (1889) ... ... = *lucina* Dist. (1887).
katharina Ribbe (1900) ... ... = *ornytion* G. & S. (1880).
lettinensis Röb. (1927) ... ... = *moaensis* Roths. (1915).
lewini Thon. (1828) ... ... = *harpalyce* Don. (1805).
mavroneria Fruh. (1914) ... ... = *omissa* Roths. (1915).
mirifica Sm. (1901) ... ... = *weiskei* Ribbe (1900).
oisyme Fruh. (1910) ... ... = *lara* Bdv. (1836).
pasithoe Linn. (1767) ... ... = *aglaia* Linn. (1758).
philomela Röb. (1919) ... ... = *eumolpe* Sm. (1889).
philyra Godt. (1819) ... ... = *caeneus* Linn. (1758).
plateni Stgr. (1894) ... ... = *funerea* Roths. (1894).
plexaris Donov. (1805) ... ... = *caeneus* L. (1758).

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protocharis Bdv. (1836) ... ... = *argenthona* Fabr. (1793) ♀.
rothschildi Kenr. (1909), praeocc. ... = *flavopicta* Jord. (1911).
rubrina Van Eecke (1915) ... ... = *nais* Jord. (1911).
saturnia Fruh. (1910) ... ... = *hemera* Fruh. (1910).
surya Mitis (1893) ... ... = *horsfieldi* Gray (1831).
taiwana Wilem. (1909) partim. ... = *wilemani* Jord. (1925).
theodora Tind. (1927) ... ... = *tindalii* J. & T. (1926).
vishnu Moore (1857) ... ... = *timorensis* Bdv. (1836).
yedanula Fruh. (1910), descrip. ambig. = a form of the *belladonna* group.

GROUP I.

Species of more than average size. Upperside white with a large black apical area on the fore wing. Underside of fore wing mostly white. Hind wing mostly yellow with a well-defined dark marginal border in which are placed large yellow or white submarginal spots. At the base, colour not different to the ground-colour, and therefore without a basal spot.

Scent-scale rather long and tapering, the base slightly concave. Disk relatively small.

Valve with a broad finger-like process of variable length. Dorsal edge strongly excurved posteriorly.

Uncus type of Group 5.

Contains four species.

Key to Species.

1. Fore wing below with the proximal area black ... ... *kühni*
   Fore wing below with proximal area white 2
2. Hind wing below with black vein stripes ... ... *singhapura*
   Hind wing below without black vein stripes 3
3. Hind wing above with prominent submarginal spot ... ... *themis*
   Hind wing above with marginal spots ... ... *agoranis*

1 (1). D. AGORANIS H. G. Smith (1887) (pl. xxxvii, fig. 1).

Delias agoranis Smith **191**, p. 266 (Burma, Siamese frontier) ♂.
,, ,, ,, Smith and Kirby **198**, figs. 7, 8.
,, ,, ,, Mitis **137**, p. 108.
,, ,, ,, Butler **14**, p. 156.
Piccarda agoranis Smith, Moore **143**, p. 182, ♂ ♀, pl. 535, figs. 2, 2*a*.

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Delias agostina agoranis Smith, Bingham **3**, p. 147.
,, *singhapura agoranis* Smith, Fruhstorfer 68, p. 124.
,, *agoranis* Smith, Riley and Godfrey, *Journ. Nat. Hist. Soc. Siam* **4**, p. 169 (1921).
,, ,, Smith, Adamson, *List. Burm. Butt.*, p. 40 (1897).

Distinguished from *singhapura* by the absence of black veinstripes on the hind wing below.

♂. Upperside white. Fore wing with the costa broadly greyish-black, and similar dusting beyond end of cell. Distal margin broadly black and narrowing posteriorly to the inner margin, not touching the margin below vein 2. A series of small white submarginal spots, those in 4-6 larger than the others. Hind wing with a series of black triangular marginal spots at the ends of the veins, those on 2 and 3 much larger than the others.

Underside of fore wing with white proximal half, but black costal border, cell dusted, and veins black. Beyond the cell some narrow white stripes, and submarginal spots as above but larger. Hind wing pale lemon-yellow with a broad black marginal border bearing a submarginal row of six moderately large white spots, the anterior two tinged with yellow.

♀. Upperside of fore wing brownish-black, with the cell and a streak between the veins dusky-white. Hind wing white with a brownish-black marginal border, and submarginal greyish-white interspaces. Underside of fore wing with veins more broadly black than in the ♂. Hind wing as in the ♂.

Length of fore wing about 38 mm.

Habitat.—Tenasserim, Burma, Siam. Coll. Brit. Mus. ♂ (Mergui); One ♂ North Siam, Prae Dist., 19.4.19, E. J. Godfrey; ♀ (Tavoy) Neallotype Moore. Type taken by Colonel C. H. E. Adamson at Tounggya Sekkan, Middle Tenasserim, April, 1880. In Coll. Adamson.

We have been unable to dissect this rare species, of which no example exists in the Hill Museum. The figure on plate xxxvii is reproduced from a specimen in the British Museum, photographed by permission of the Trustees.

2. D. SINGHAPURA Wall.

This species is distinguished from the allied *agoranis* by the hind wing beneath having the veins black. The submarginal spots of the hind wing are larger. Fore wing above with the dark apical area reaching to the cell.

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Length of fore wing ♂ ♀ : 32—41 mm.

Distribution.—Malay Peninsula, Siam, Sumatra, Borneo.

Three races are known.

2A (2). *D. singhapura singhapura* Wall. (1867) (pl. xxxvii, fig. 2).

Thyca singhapura Wallace **228**, p. 353, pl. vii, fig. 2 ♂ (Singapore).
Delias singhapura Wall., Butler **9**, p. 33; **14**, p. 156.
,, ,, Wall., Distant **23**, p. 293, fig. 100.
,, ,, Wall., Mitis **137**, pp. 108, 142.

♂. Upperside white, veins black on the fore wing for the greater part, and on the hind wing distally. Fore wing with blackish apical area reaching the cell. Hind wing with narrow blackish marginal border from anal angle to cellule 3, and small blackish marginal marks on veins 3-5.

Underside of fore wing white with the veins scaled with black, more so in the apical area. Apex black, either narrowly or not broader than half the distance between apex and cell. In the whiter specimens a narrow black submarginal line marks off the submarginal spots which are better defined in darker specimens.

Submarginal spots six, somewhat ovate and twice as large in some specimens as in others. Hind wing bright yellow with the veins and costal edge black. A black marginal border from 5—7 mm. broad, slightly extended on the veins. A submarginal series of six spots, the lower four greyish-white and incurved proximally, the anterior two yellow.

Scent-scale.—(pl. xviii, fig. 1). Very similar to the Borneo race but narrower at the base and slightly excurved posteriorly.

Genitalia.

Valve (pl. viii, fig. 1). Distal edge with a short and broad process. Dorsal edge nearly straight, strongly excurved posteriorly. Cavity large. Ventral fold with posterior proximal edge slightly chitinized.

Uncus type 5.

Habitat.—Singapore, Mergui, Siam.

A very rare species, of which only the ♂ is known. There is a single specimen (ex Coll. Grose-Smith) in the Hill Museum, from Mergui. Type in the Brit. Mus., from Singapore, also a ♂ from Siam (Godfrey Coll.).

Our figure is from a photograph of the type, made by permission of the Trustees of the British Museum.

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2B (3). *D. singhapura acuta* Roths. (1915).

Delias singhapura acuta Rothschild **180**, p. 172.
Delias singhapura Wall., Hagen **84**, p. 33.

(Original description).

♂. "Fore wing more pointed than in *s. singhapura* and narrowing sharply to apex. Above differs from both *singhapura* and *s. indistincta* in having the black on outer ⅓ of fore wing absent below vein 2, and reduced to a narrow submarginal cloud between veins 2 and 3. Below the yellow of hind wing is darker and the submarginal patches smaller.

♀. "Fore wing long and pointed as in ♂, *not* rounded. Above more strongly clouded with black. Below the yellow area is reduced and the submarginal spots much smaller.

"*Habitat.*— ♂ Karo, August, 1891 (Hagen Coll.); ♀ Selesseh, S.E. Sumatra, July 25, 1894 (Dr. Martin) (♀ type)."

We have no record of any other specimens; all in Mus. Tring.

2c (4). *D. singhapura indistincta* Fruh. (1897).

Delias singhapura indistincta Fruhstorfer **52**, p. 335; **68**, p. 124. t. 55d.
,, ,, Wall., Distant and Pryer **24**, p. 269.
,, ,, Wall., Druce, *Proc. Zool. Soc. Lond.*, 1873, p. 355.
,, ,, Wall., Smith and Kirby **199**, Del. iii. figs. 1, 2 ♀.
,, ,, Wall., Butler **14**, p. 156.
,, ,, *indistincta* Fruh., Shelford **189**, pp. 36, 41.
,, ,, *indistincta* Fruh., Moulton **145**, p. 4 (= *singhapura*).

Scent-scale, Dixey, *Proc. Ent. Soc. Lond.*, 1909, p. cxii.

This race is variable and some specimens appear very close to the typical form. The hind wing above has less marginal black. On the fore wing the black area usually extends into the cell, and below the apical black area is broader with smaller submarginal spots.

♀ similar to the ♂. Upperside creamy-white. Fore wing with fuscous-brown distal area which does not enter the cell and is broader posteriorly than in the ♂, two small white submarginal spots in 1b. Hind wing with broad fuscous-brown marginal border which is more or less dusted with ground-colour. Underside as in the ♂, but the submarginal spots of the hind wing are usually yellow, and the outer half of cell and bases of cellules 4-6 more or less white.

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Scent-scale.—(pl. xviii, fig. 2). As in the Singapore race, but broader at the base.

Genitalia.

Valve (pl. viii, fig. 2). As in *s. singhapura*. The cavity appears larger. The ventral fold with the posterior proximal edge more strongly chitinized than in *s. singhapura*.

Uncus (pl. i, fig. 1). Type of group 5. Middle lobe simple and small. Tegumen strongly excurved at the middle.

Lamina dentata (pl. vii, fig. 64). Long and moderately broad, distal ends rounded and margins much thickened. Anterior and posterior margins strongly incurved at the middle. Teeth strongly developed on the margins.

Length = ca. 1·3 mm., breadth, ca. 2 mm.

Habitat.—Borneo: On Mt. Kinabalu, 2,700-3,500 feet; Mt. Matang 3,200 feet; Mt. Sandubong, 2,600 feet; Mt. Penrissen, 4,000 feet; Sarawak, South, South-east and West Borneo. Type ♂ from South Borneo, in Coll. Fruhstorfer.

A common species in Borneo.

3. D. THEMIS Hew.

This species somewhat resembles *singhapura* above. The hind wing has a broad dark marginal border in which submarginal spots are usually prominent, as well as on the fore wing. The hind wing below is without black vein stripes and the marginal border is sharply defined. Length of fore wing: ♂ ♀, 31—40 mm.

Distribution.—Philippines. Two races are known.

3A (5). *D. themis themis* Hew. (1861).

Pieris themis Hewitson **93**, Pieris v, figs. 31, 32, ♂.
Thyca themis Hew., Wallace **228**, p. 354 ♀.
Delias themis Hew., Semper **188**, p. 230, t. xxxiv, fig. 1.
,, ,, Hew., Mitis **137**, p. 109.
,, ,, Hew., Butler **14**, p. 156.
,, ,, Hew., Fruhstorfer **68**, p. 124.

♂. Upperside resembles *singhapura*. Fore wing apical black area sharply defined and not reaching below vein 2, extending to the cell and to a half or two-thirds of cellule 3. Submarginal spots as below indistinctly marked above. Hind wing with broad blackish marginal

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border, its inner edge usually nebulous. A series of white submarginal spots not well defined.

Underside of fore wing with costa and apical half brownish-black. A subcostal bar of four white spots beyond end of cell, divided by the black veins; veins 2 and 3 white except at their distal ends. A series of five large ovate white submarginal spots, those in cellules 5 and 6 larger than the others. Hind wing lemon-yellow, the costa narrowly black. A broad brownish-black marginal border reaching to more than half the distance between end of cell and margin, angled at vein 4. A series of six white submarginal spots, those in 1c and 4 smaller than the others; these spots are proximally narrow, and the anterior one is washed with yellow.

♀. Upperside yellowish- to creamy-white. Fore wing with brownish-black costa and apical half extending into the cell and to below vein 2. Spots of the underside showing through. Hind wing with rather broad brownish-black sharply defined marginal border with the spots of the underside slightly showing through.

Underside as in the ♂. Fore wing with extended black area, the spot in 4 of the subcostal series reduced or absent. Hind wing margin as above, but still more sharply defined. Submarginal spots larger than in the ♂ and the one in 5 also tinged with yellow.

Scent-scale.—(Pl. xviii, fig. 3). Similar to *singhapura*, base more incurved.

Genitalia:—

Valve (from a specimen of the Luzon race) (pl. viii, fig. 3). Distal edge with a broad and long finger-like process. Dorsal edge slightly incurved, strongly excurved posteriorly. Ventral fold with chitinized proximal edge. Cavity large.

Uncus (pl. i, fig. 2).

Type of group 5. Middle lobe forked. Tegumen slightly excurved.

Habitat.—Philippines: Mindanao, Cebu, Panaon.

According to Semper this species flies from April to October. Types ♂ ♀ in British Museum from Mindanao.

3B (6). *D. themis soteira* Fruhst. (1910) (pl. xxxvii, fig. 3).

♂. *Delias themis soteira* Fruhstorfer 68, p. 124, t. 55d.

♂. Upperside submarginal spots more strongly marked. Underside of fore wing with the distal black extending broadly to vein 2, leaving a well-defined submarginal spot in cellule 2.

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♀. Upperside of fore wing with a white instead of yellowish ground-colour, and of hind wing with a creamy instead of yellowish ground-colour. Underside of fore wing with black marginal area extending to below vein 2 where a white submarginal spot is cut off or at least indicated.

Habitat.—Philippines: Luzon, Polillo. In Hill Mus. a series of two ♂ ♂ and three ♀ ♀ from Polillo, and one ♂, one ♀ from S. Luzon.

Type ♂ from Luzon in Coll. Fruhstorfer.

4. D. KÜHNI Honr.

Upperside resembles *singhapura* with white subapical spots. Fore wing below black-brown with white spots only in the discal area. Hind wing below yellow without vein stripes, but with a broad black-brown marginal border bearing submarginal spots of which the ones in 2 and 4 are smaller than the others. Length of fore wing: ♂ ♀ about 37 mm.

Distribution.—Celebes to Sula Islands. Three races are known.

4A (7). *D. kühni prinsi* Mart. (1912).

Delias prinsi Martin **131**, p. 277; **132**, t. vii, figs. 1, 2 ♂.

♂. Upperside of fore wing similar to *kühni*, but the black less extended in cellule 3 and the submarginal spots larger and better defined. Underside of fore wing with margins as in *kühni* but the submarginal spots better defined. Hind wing with a broader marginal border than in *kühni*, and with a series of six yellow spots, the posterior one double. The spot in 3 is more rounded and much larger than the others, the one in 2 is triangular with its apex distad.

Only one ♂ at present known.

Habitat.—Central Celebes: Kolawai district, October, 1912. Type in Mus. Munich.

4B (8). *D. kühni kühni* Honr. (1886) (pl. xxxvii, figs. 4, 5).

Delias kühni Honrath **97**, p. 2[illegible]5, pl. vi, fig. 2 ♂.
,, ,, Honr., Mitis **137**, p. 109.
,, ,, Honr., Staudinger **213**, p. 354.
,, ,, Honr., Butler **14**, p. 156.
,, ,, Honr., Fruhstorfer **68**, p. 124.

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♂. Upperside white. Fore wing with greyish-black distal area, the edge of which is ill-defined. This area does not enter the cell and narrows posteriorly. Subapical white spots five, the ones in 5 and 6 longer than the others. Costa and basal area greyish-black. Hind wing with some black marginal spots, the posterior ones usually oblong and much larger than the others on veins 2—4. Some greyish-black dusting at the base.

Underside of fore wing fuscous-black with white spots. Subapical spots as above but much larger and better defined, the one in three more rounded than the others. A small submarginal spot in 2 and a smaller double spot on the submedian fold. A subcostal patch formed of an oblong spot in 8, a small spot in the base of 6, and a somewhat ovate and larger spot in 5. Hind wing chrome-yellow (*without* black veins as shown by Honrath) and with a fuscous-black marginal border about 9 mm. broad on vein 3, its edge almost evenly curved and well-defined. Five yellow submarginal spots, the one in 6 larger than the others, and the ones in 3 and 5 larger than those in 2 and 4. Some slight black dusting at the base.

♀. Upperside greyish-black. Fore wing with a series of seven indistinct whitish submarginal spots, the anterior three narrower than in the ♂. Hind wing with the inner margin to the cell and to before the angle white. A series of indistinct submarginal spots.

Underside similar to the ♂. Fore wing with the two posterior submarginal spots well defined, and three anterior spots narrower than in the ♂. Hind wing with the marginal border almost reaching the cell, and the submarginal spots larger than in the male.

Scent-scale (pl. xviii, fig. 4). Longer than in other species of the group, broader and flatter at the base.

Genitalia:—

Valve (pl. viii, fig. 4). Distal edge with a broad and short process. Dorsal edge nearly straight, excurved posteriorly. Cavity small. Ventral fold with a chitinized posterior edge.

Uncus (pl. i, fig. 3). Type of group 5. Middle lobe triangular and narrow, outer ones rather broad. Tegumen excurved about the middle.

Habitat.—Banggkai Island, East Celebes. Types ♂ ♀ in Brit. Mus. (coll. Adams).

A rare species in collections.

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4c (9). *D. kühni sulana* Stgr. (1894).

Delias kühni var. *sulana* Staudinger **213**, p. 354.
„ „ „ Stgr., Fruhstorfer **68**, p. 124.

♂. Upperside bluish-white, with black distal area and indistinct submarginal spots. Hind wing yellowish-white with dark marginal border narrowing anteriorly. Underside with much smaller submarginal spots than in *kühni* and on the hind wing only 3-4 such spots.

♀. Fore wing above as in *kühni* but with only two small and indistinct subapical streaks. Underside as in the ♂ except that the spots of fore wing are larger, and on the hind wing the marginal band is broader and there are six submarginal spots of which the two anterior ones are yellow, the others yellowish-grey, and the posterior one minute.

Habitat.—Sula Mangoli, one ♂, one ♀ taken by Dr. Platen. Types in Mus. Berlin. No other specimens appear to be known. The few words given by Fruhstorfer in Seitz to this form are misleading.

GROUP 2.

Species of small to moderate size. No single pattern-character is peculiar to the group, but it may be divided into five sections.

Scent-scale of the same type as in Group 1, with a relatively small disk.

Valve with a short, rather broad and rounded apical process. Dorsal edge strongly excurved posteriorly.

Uncus of the type of Group 6, with the exception of *schuppi* which belongs to Group 5 and may possibly come into our Group 1 of species.

Contains 15 species.

Section A.—Fore wing black with white spots. Hind wing below mostly yellow, black at the base and with broad black distal margin. Species 6.

Section B.—Fore wing above white or yellow. Hind wing below with submarginal patches and usually a rounded discal patch. Species 5.

Section C.—Fore wing above white. Hind wing below blackish-brown with small submarginal spots, and sometimes with white discal markings. Species 9, 10, 11, 13, 14, 15.

Section D.—Fore wing below blackish-brown with white or yellow spots. Hind wing below yellow to the base of costa, and with dark distal border bearing large submarginal spots. Species 7, 8, 12.

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Section E.—Fore wing below mostly white with a blackish-brown costa and discocellular bar. Hind wing below with proximal two-thirds or more yellow, dark marginal border and yellow submarginal spots. Species 16, 17, 18, 19.

The species *blanca*, *schuppi*, *dumasi* and *waterstradti* are evidently closely related to the species in Group 1, and to a less extent are the species in Section E, those in Sections B and C being farther removed.

5. **D. GEORGINA** Feld.

Upperside yellow (*battana*) or white with black distal area on the fore wing and narrow black margin or small marginal spots on the hind wing. Fore wing below somewhat as in *themis*. Hind wing below with black-brown ground-colour, and markings pale yellow to orange-yellow. An oblong basal costal patch, large submarginal spots which posteriorly are represented by stripes, and a discal patch not always entirely separated from the submarginal stripes.

Not so large as the preceding species, and with a more rounded fore wing. Length of fore wing, ♂ 28—33 mm., ♀ 25—31 mm.

Distribution.—Malay Peninsula, Sumatra, Borneo, Luzon, Celebes

Six races are known.

5A (10). *D. georgina orphne* Wall. (1867), (pl. liv, fig. 1).

Thyca orphne Wallace **228**, p. 361, pl. viii, fig. 2 (1867) (Malacca) ♂.
Delias orphne Wall., Butler **7**, p. 166; **9**, p. 36; **14**, p. 166.
,, ,, Wall., Distant **23**, p. 293, fig. 101.
,, ,, Wall., Mitis **137**, p. 103.
,, ,, Wall., Fruhstorfer **68**, p. 129.
,, ,, Wall., Moulton **145**, p. 8, ♀

♂. Upperside white. Fore wing with narrow black distal margin, broader at the apex and reaching to vein 2 or slightly below it. Apical area more or less dusted with black which does not reach the cell, and in darker specimens with three small subapical white spots; the veins distally black, also the discocellulars and upper margin of cell. Hind wing with slight black marginal dusting.

Underside of fore wing with white proximal area invaded by blackish-brown on the discocellular where a broad bar is formed merged with the black-brown costa. Some black basal dusting. A broad blackish-brown distal border broadest from the costa to cellule 4, between which its edge is straight, excurved in cellule 3 and narrowing posteriorly to

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the submedian. Three small subapical spots in 4, 5, 6, 8, and two larger submarginal spots in 2 and 3, the one in 3 the larger.

Hind wing with blackish-brown ground-colour and orange-yellow patches. An oblong basal costal patch reaching the cell; a large somewhat rounded discal patch occupying the outer half of cell and reaching slightly beyond it. A series of submarginal patches increasing in size posteriorly; anterior spot in 7 small and indistinct, the ones in 6 and 5 somewhat ovate and separated, the one in 4 larger and pointed proximally, the ones in 3 and 2 longer and almost reaching the cell, these three only divided by the veins, the remaining patches merged together from the base of inner margin to vein 2, and to the margin at the submedian. There is a small spot in the base of cellule 6. Fringes blackish-brown, marked with white between the veins, and white below vein 2 on the fore wing. Length of fore wing, 31 mm.

♀ (Original description *vide* Moulton).

"Upperside grey-fuscous. Fore wing with markings as in female *cinerascens* but much more darkly dusted with grey-fuscous. Hind wing entirely grey-fuscous, but lightly dusted with yellow scales, the median veins with white scales. Inner margin yellowish-white.

"Underside as in the male figured by Wallace, Exp. al. 56 mm."

Habitat.—Malay Peninsula: Mount Ophir, ♂ ♀ types in Brit. Mus.; ♀ neallotype from Mount Ophir (Padang, Batu), 2,400 feet, August 1905, coll. R. Hanitsch.

A rare species in collections, only a few males known; we have no record of a second female. Whitehead, who visited Mount Ophir, speaks of the butterfly as common (*Expl. Kina Balu*, p. 16, 1893). In Hill Museum three ♂ ♂, one being from Wallace's original series, the others labelled "Kina Balu," all ex coll. Grose-Smith.

5B (11). *D. georgina tahanica* Roths. (1925).

Delias orphne tahanica Rothschild 182, p. 675, Mt. Tahan, Malay Pen., ♂.

♂ (Original description).

"Differs above from *o. orphne* in its larger size, more pointed fore wing, and in the much greater white suffusion on apex and outer marginal ¼ of wing, also reduced discocellular stigma.

"Below the fore wings are much blacker and the submarginal white spots larger; on the hind wing the yellow is more extended, and paler, the dark portions being reduced.

"Expanse.—*o. tahanica*, 70 mm.; length, fore wing 33 mm.
o. orphne, 62 mm; ,, ,, ,, 29 mm.

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"*Habitat.*—One ♂, Mount Tahan, Malay Peninsula (**Waterstradt** Coll.)."

Type ♂ in Mus. Tring. No other specimens known.

5c (12). *D. georgina simanabum* Hag. (1894) (pl. xxxvii, figs **6, 7**).

Delias simanabum Hagen **84**, p. 34, pl. i, fig. 3 ♀ (Sumatra); **85**, p. 157.
" " Hag., Butler **14**, p. 166.
Delias hageni Martin and de Nicéville **133**, p. 489 (partim).
" " " " Hag., Fruhst., **68**, p. 130.
♂. *Delias orphne simanabum* Hag., Joicey and Talbot, **111**, p. 636, West Sumatra.

♂ (Original description).

"Fore wing above with an ill-defined black postdiscal area, defining the submarginal spots of the underside, and some black dusting on the discocellular, defining the post-cellular spots below. Below the markings much as in the figured female, the subapical spot smaller, the three post-cellular spots larger, and the two spots in 2 and 3 more separated. Basal area more strongly dusted with black and reduced distally below vein 4.

"Underside of hind wing with the brown markings more developed than in the figured ♀; some basal dusting below the cell continued to about middle of 1c, where a heavier mark is formed; some brown scaling in base of 2 and 3, and near base in 5, 6 and 7, the last three spots joined, the one in 5 connected with margin along vein 6. These marks are a vestige of the ground colour in *orphne*, the larger spots in that form being here almost completely joined together.

"A female taken at the same time and place, and similar to another one in the collection of Mr. Brooks, is marked below like the ♂, but on the upperside is unlike the one figured by Hagen. The fore wing is nearly black, the spots smaller, and the outer ones farther from the margin. In the hind wing there is more black basal dusting.

"There is not enough material to show that this form is really different from the one described by Hagen, and some slight variation of this kind is seen in the allied *cinerascens* from Borneo."

♀. Upperside of fore wing resembling *cinerascens* ♀ but much darker. Ground-colour black with suffused white markings. A stripe in the cell, not reaching end of cell, one in 1b from base to near the margin, a shorter one in 2, and a spot at the base of 3 all indistinct.

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Three short subcostal streaks in 4, 5, and 8, and five submarginal spots white dusted lightly with black. The two lower submarginal spots larger than the others.

Hind wing creamy-yellow, the basal area dusted with black, the veins, except the discocellulars, black, and a narrow black marginal border from above vein 7 to cellule 1b. A black postdiscal line from costa to vein 6, expanded as a spot in cellule 5; an indistinct spot in the base of cellule 3.

Underside of fore wing as above, but the stripes and spots much better defined, the spots larger and a minute submarginal spot below vein 2. Hind wing lemon-yellow, the distal stripes edged with white, and slightly pointed distally as in the ♂. Dark postcellular marks as in the ♂.

Length of fore wing, ♂ 30 mm., ♀ 27 mm.

Habitat.—North-east Sumatra, Mount Simanabum, ♀ type (Mus. Tring); West Sumatra, Lebong Tandai, Mount Lalangie, 2,500 feet, July, 1923, C. J. Brooks, ♂ neallotype and one ♀ (Hill Mus.).

5D (13). *D. georgina cinerascens* Mitis (1893).

Delias georgina var. *cinerascens* Mitis **137**, p. 126, pl. ii, fig. 2 ♀ (Mount Kinabalu).
,, ,, ,, Mitis, Butler **14**, p. 166.
Delias orphne cinerascens Mitis, Fruhstorfer **68**, p. 130, t. 54e, ♂.
,, ,, ,, Mitis, Moulton, **145**, p. 7.
Delias hermione Moulton **144**, p. 84.
Mimicry, Shelford **189**, p. 41.

♂. Upperside similar to *orphne* but dark distal area of fore wing usually more sharply defined, reaching to vein 2 or below this, and variable in width; submarginal white spots as in *orphne* but sometimes absent.

Underside of fore wing marked as in *orphne* but proximal areas grey-white, the spot in 3 small or vestigial, the subcostal spots variable in size. Three subapical white spots as in *orphne*. Submarginal spots in 2 and 3 much smaller than in *orphne*. Hind wing with pale yellow markings, smaller than in *orphne*, the posterior stripes shorter and marginal area broader.

♀. Upperside of fore wing with a white proximal area dusted with black, comprising two-thirds of costa, the cell, submedian area, half of cellule 2, base of cellule 3, and 3 small postcellular spots. Some indistinct small submarginal white spots. Hind wing with the under-

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side patches reproduced creamy-white. Basal area grey-white to the end of vein 7, end of cell, and from inner margin to vein 4 as far as the stripes.

Underside as in the ♂.

Genitalia :—

Valve (pl. viii, fig. 5). Distal edge with a long and broad finger-like process. Dorsal edge slightly incurved; excurved posteriorly. Ventral fold narrow. Cavity very small.

Uncus (pl. 1, fig. 4). Type of Group 6. Middle lobe smaller and shorter than the outer lobes. Accessory lobe rounded and flexed inwards. Tegumen excurved at the middle.

Habitat.—North Borneo and Sarawak. Known from Mount Kinabalu, 3,000-5,150 feet; Mount Selinguid, 4,850 feet; Mount Matang, 3,200 feet, December, 1898. Type ♀ in Mus. Berlin.

Moulton says that it was common on the Marei Parei spur of Kinabalu in September, and equally common on the summit of Mount Selinguid 200 miles further south.

According to Shelford it is " exactly mimicked by a *Chalcosid* moth *Mimeuploea pieroides* Walk."

The two were taken at Kinabalu in September 1913.

5E (14). *D. georgina georgina* Feld. (1861) (pl. liv, fig. 2).

Pieris georgina Felder **44**, p. 298 (Luzon) ♀.
Pieris georgiana Felder **46**, p. 160, pl. xxiv, figs. 4, 5 ♀
Thyca georgina Feld., Wallace **228**, p. 361.
Delias georgina Feld., Mitis **137**, p. 102.
,, ,, Feld., Semper **188**, p. 229.
,, ,, Feld., Butler **14**, p. 166.
,, ,, Feld., Fruhstorfer **68**, p. 129.

♀. Upperside similar to *cinerascens*. Fore wing with more extended proximal white area only dusted with black at the base, the post-cellular spots larger and the lower one joined to the spot in 3. Submarginal spots well marked, four are subapical, the others in 2 and 3 large with slight distal projection. Hind wing with more extended and lighter proximal area than in *cinerascens*.

Underside of fore wing as above, the spots larger, especially the subapical ones, and the cell stripe shorter. Hind wing with coffee-brown ground-colour, markings as in *cinerascens* but chrome-yellow with white edging to most of the spots; the spots and stripes placed

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farther from the cell. The yellow on the inner margin extends to the base.

Length of fore wing 31 mm.

♂ apparently unknown.

Habitat.—Luzon. The type is not in Mus. Tring and we do not know its present whereabouts. The specimen noted by Semper was taken on the mountains near Mariveles at 600 metres, West Luzon, in March. A specimen in the Hill Museum obtained from the firm of Staudinger and Bang-Haas came from Balblat, West Luzon. We have seen no specimens in other Museums.

5F (15). *D. georgina battana* Fruh. (1896).

Fruhstorfer **50**, p. 9 (S. Celebes); **51**, p. 393, t. ix, figs, 6, 7, ♂ ♀; **68**, p. 127, t. 54f.

♂. Upperside sulphur-yellow. Fore wing with a black distal marginal border of variable width, but not reaching the cell. The inner broader part of this area is grey-black, separated from the narrower marginal black border by six yellow submarginal spots, of which the two lower ones are usually larger than the others. Costal margin and veins black, often a black discocellular bar joined to the costa. Some slight dark basal scaling. Hind wing with the veins only black at the margin, inner margin greyish-white, slight dark basal dusting and sometimes an indistinct black postdiscal mark in cellules 4 and 5.

Underside with deep coffee-brown ground-colour and veins, and pale yellow markings. Fore wing with a cell-patch between veins 2 and 3, pale yellow below the cell from inner margin to vein 4, the stripe in 2 shorter than the one below it and a spot at the base of 3. A post-cellular bar formed by a narrow subcostal stripe, and two somewhat square spots in 4 and 5. Submarginal spots much larger than above, the one in 3 the larger, and the one in 6 the longer, all with prolongations to the margin; a small marginal spot in 1b.

Hind wing markings much as in *georgina*, all the stripes distally narrow and touching the margin, forming five triangular marginal spots; the one in 6 extends nearly to the base of the cellule, the one in 3 nearly to the cell, the one in 1c broken before the end of the stripe above it. Discal patch extending well beyond the cell in 4 and 5. All the patches are marked with a deep yellow line through the middle. Basal area dusted with grey.

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♀. Upperside creamy-white and similar to *georgina*. Fore wing markings as on the ♂ underside, but white proximal area more complete and submarginal spots smaller. Hind wing with small triangular black marginal spots on veins 2-5, and a more or less distinct black bar beyond end of cell.

Underside of fore wing as in the ♂, spots larger. Hind wing as in the ♂. Length of fore wing ♂—*circ.* 28 mm., ♀—*circ.* 25 mm.

Scent-scales (pl. xviii, fig. 5).

Rather long; at the base laterally rounded.

Genitalia:—

Valve (pl. viii, fig. 6). Distal edge with a short broad and rounded process. Dorsal edge anteriorly incurved, then excurved. Ventral fold without a defined proximal edge. Cavity not seen.

Uncus.—Type of Group 6. Middle lobe narrow and pointed, curved inward. Outer lobes small and round, joined to a similarly shaped accessory lobe below. Tegumen slightly incurved and very broad posteriorly.

Lamina dentata (pl. vii, fig. 62). Moderately short and broad, distal ends oblique. The middle of the anterior and posterior margins slightly incurved. Teeth strongly developed and not extended to the distal margin. Length = *circ.* 1 mm., breadth *circ.* 2 mm.

Habitat.—South Celebes, Peak of Bonthain, 5,000-6,000 feet, February-March. Type specimens taken on the Lompo Batang at 5,000-6,000 feet elevation. Type ♂ in coll. Fruhstorfer, type ♀ in Mus. Paris, also a ♂ paratype. Specimens in the Hill Mus. from Bua-Kraeng, 5,000 feet, February, 1896, taken by H. Fruhstorfer.

According to Fruhstorfer (68), "*battana* was commonest in misty or even rainy weather. The butterflies came hurrying out of the neighbouring wood, straight down from the trees, and were carried by the wind over an adjoining heath. Here they could then be captured with little trouble and the natives even brought me uninjured specimens taken with their hands. Once in the net these *Delias* remained completely passive and sat quietly with the wings folded. All this was changed in sunny weather. The butterflies flew then at an inaccessible height, encircling the tops of flowering trees, and we only succeeded by chance in catching one of them."

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5F (16). *D. battana* ♂ f. *defasciata* Niep. (1920).

Niepelt **155**, p. 17.

♂. Only differs from the typical form in the dark distal border of the fore wing above being almost absent and represented by only some scattered dark brown scales. The black marginal border remains.

Type from South Celebes in Hill Mus.; also a second ♂ from South Celebes, ex coll. Druce.

5F (17). *D. battana* ♀ f. *auricoma* Fruh. (1911).

Fruhstorfer **68**, p. 129.

This is merely a colour form in which the upperside is ochre-yellow to pale buff, and the fore wing below a little paler than above.

Specimens in the Hill Mus. bearing the same data as typical ♂ ♀ mentioned above, also from Lompo-Battan, 3,000 metres, March, 1896.

Type specimen in coll. Fruhstorfer.

6. **D. BLANCA** Feld.

Upperside of fore wing black with grey-white markings. Hind wing with yellow proximal area on which black vein-stripes are conspicuous, and black distal area bearing small grey-white submarginal spots. The underside is similar to the upper, and the yellow area of the hind wing does not reach the base of the wing.

Distribution.—Philippines, Borneo. Three races are known.

6A (18). *D. blanca blanca* Feld. (1862) (pl. lx, fig. 4).

Pieris blanca Felder **45**, p. 284 ♂; **46**, p. 160, pl. 24, figs. 6, 7 (1865).
Thyca blanca Feld., Wallace **228**, p. 353, ♂.
Delias blanca Feld., Semper **188**, p. 229, ♂ (N.E. Luzon).
,, ,, Feld., Mitis **137**, p. 102.
,, ,, Feld., Butler **14**, p. 166.
,, ,, Feld., Fruhstorfer **68**, p. 131.

♂. Fore wing above blackish-brown. Markings white, dusted with bluish-grey. A stripe in cellule 2 and a longer one below the cell divided by the submedian, four short and narrow post cellular stripes. A series of seven submarginal spots, the two apical ones longer than the others and the one in 3 large, somewhat square, and placed more proximal. Hind wing blackish-brown. Proximal area, except the base, lemon-yellow, composed of stripes and spots separated by the black veins, comprising the cell, two long posterior stripes separated by the submedian, an oblong patch in the base of cellule 2, a short streak in 3 and 4, a

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larger spot in 5, and another in 6. A series of small and rounded grey-white submarginal spots.

Underside of fore wing similar to above, the proximal markings whiter. Two short stripes in the cell. Anterior submarginal streak divided into two spots, the three submarginal spots below this are < shaped. Hind wing as on upperside, the submarginal spots larger. Length of fore wing, 33 mm.

Habitat.—Luzon. Semper records a ♂ taken in North-East Luzon in July. No other specimens appear to be known. The type is not in Mus. Tring, and we have no knowledge of its whereabouts.

We have not seen a specimen of this form, and our figure is taken from Felder.

6B (19). *D. blanca apameia* Fruh. (1910).

Delias blanca apameia Fruhstorfer **68**, p. 131.

Delias blanca Feld., Semper **188**, p. 229 (S.E. Mindanao) ♀.

♀. The submarginal spots are bluish-grey and placed farther from the distal margin. Fore wing with the stripes in 2 and below the cell forming a large patch. Hind wing with reduced yellow area.

Length of fore wing, 38 mm.

Habitat.—Mindanao. Only 2 ♀ ♀ known, taken by Dr. Platen and both in Mus. Berlin.

6C (20). *D. blanca nausicaa* Fruh. (1899).

Delias blanca nausicaa Fruhstorfer **53**, p. 60 (North Borneo); **55**, p. 358, ♂ ♀; **63**, t. ii, figs. 1 ♂, 2 ♀. **68**, p. 131, t. 54.

" " " Fruh., Moulton **145**, p. 8.

♂ ♀. Markings of the upperside smaller and less distinct than in other forms; fore wing with the inner margin dusted with bluish-grey; submarginal spots small, very slight on the hind wing and placed farther from the margin. Underside with the submarginal spots mostly < shaped. Yellow area of the hind wing less extended than in the Luzon race and more sharply defined than above.

Habitat.—North Borneo: Mt. Kinabalu (Waterstradt). ♂ type in coll. Fruhstorfer, also 1 ♂ in Mus. Berlin. The ♀ is said to be in coll. Fruhstorfer; no other specimens known.

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7 (21). **D. SCHUPPI** Talb. (1928) (pl. liv. fig. 3).

Delias schuppi Talbot **222**, p. 40.

A very distinct species with some resemblance to *kühni* Honr., *dumasi* Roths., and *vidua* J. and T. The rather broad black margin of the hind wing below suggests a *kühni* form, but its edge is proximally scalloped, the wings are more rounded, and the second and third subcostals of the fore wing are shorter than in *kühni*. The genitalia and scent-scale are typical of the group, but both are distinct from *kühni*.

♂ (Original description).

" Upperside of fore wing with a narrow black margin from beyond the apex to below vein 2 where it tapers off; this border is extended in cellule 3, reaching to the middle of vein 4, with black dusting to the cell, and only slightly along vein 3. Above vein 4 there is some black dusting extending to the costa and to about midway between cell and margin, leaving two spots of white ground-colour in 5 and 6. The veins distally and at end of cell are black. Fringe black to the submedian, and white along inner edge. Hind wing with narrow (about 3 mm. wide) black distal border from anal angle to middle of cellule 4, and continued as a line to about vein 6; its edge crenulate and not sharply defined.

" Underside of fore wing black with markings much as in *dumasi*. Basal area grey with slight yellow tinge below costa. Inner edge white slightly dusted with brown, this area sharply defined just above the submedian fold. A white subcostal spot, its upper part oblong in cellule 8 just beyond the cell, with an extension of the distal edge reaching vein 5. Five subapical spots as in *dumasi*, anterior three yellow, others white. The spot in 6 is larger and slightly narrowed proximally as well as the spot in 8; spots in 7 and 4 very small, the one in 5 rounded.

" Hind wing yellow with black distal border broader than in *dumasi* (6 mm. on vein 4) and with smaller marginal yellow spots. The two anterior marginal spots much larger than the others, the upper one projects beyond the next one, and together with the spot in 4 are only separated by the veins; the other spots in 1c, 2 and 3 are rather small, the one in 1c composed of two dots. The edge of the black border is scalloped as in *dumasi* but more strongly. Veins forming the end of the cell scaled with white.

" Length of fore wing 35 mm."

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Scent-scale (pl. xviii, fig. 6).

Long and narrow, the base produced laterally to a short process, a formation rare in *Delias* but often seen in other Pierinae.

Genitalia:—

Valve (pl. viii, fig. 7). Distal edge with a narrow finger-like process. Dorsal edge incurved, excurved posteriorly. Ventral fold without a defined proximal edge. Cavity not seen.

Uncus.—Belongs to the type of Group 5.

Habitat.—Ceram. ♂ type in Mus. Munich ex coll. Hagen, without locality. Also one ♂ in Mus. Leiden, obtained in Ceram by one of Dr. Piepers' collectors. No other specimens are known.

We are indebted to Baron Dr. von Rosen for the loan of the type and for permission to examine the genitalia and scent-scales. He first drew our attention to this species by sending an excellent coloured figure for identification. After the original description had gone to press, the author was examining specimens in the Leiden Museum and was agreeably surprised to find a second specimen which was labelled "Ceram."

(*To be continued*)

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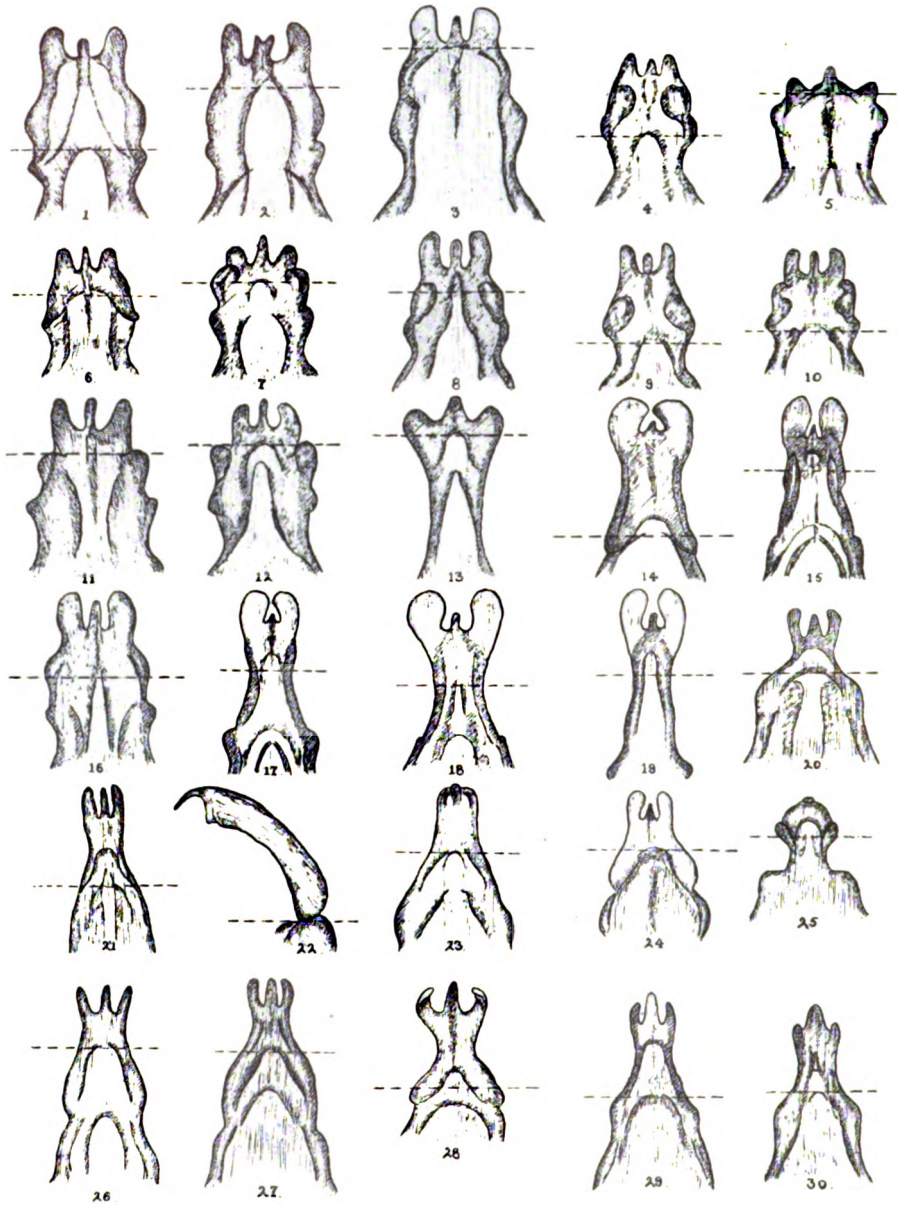

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EXPLANATION OF PLATE I.

GENITALIA OF *Delias*.

The Uncus.

All drawings are made to the same magnification.

The dotted line indicates the approximate point of attachment of the scaphium.

Fig. 1. *Delias singhapura indistincta* (Group i).
,, 2. ,, *themis* (Group i).
,, 3. ,, *kühni* (Group i).
,, 4. ,, *georgina cinerascens* (Group ii).
,, 5. ,, *vidua* (Group ii).
,, 6. ,, *eschatia* (Group ii).
,, 7. ,, *manuselensis* (Group ii).
,, 8. ,, *momea huphinoides* (Group ii).
,, 9. ,, *fruhstorferi* (Group ii).
,, 10. ,, *nysa* (Group ii).
,, 11. ,, *maudei* (Group ii).
,, 12. ,, *enniana enniana* (Group ii).
,, 13. ,, *chrysomelaena* (Group iii).
,, 14. ,, *talboti* (Group iii).
,, 15. ,, *ladas levis* (Group iii).
,, 16. ,, *dice mitisana* (Group ii).
,, 17. ,, *ladas* (Group iii).
,, 18. ,, *caliban satisbona* (Group iii).
,, 19. ,, *totila* (Group iii).
,, 20. ,, *schmassmanni* (Group iv).
,, 21. ,, *stresemanni* (Group iv).
,, 22. ,, *lecerfi* (Group iv).
,, 23. ,, *sagessa* (Group v).
,, 24. ,, *geraldina* (Group v).
,, 25. ,, *eudiabolus* (Group v).
,, 26. ,, *microsticha* (Group v).
,, 27. ,, *flavopicta* (Group v).
,, 28. ,, *rileyi* (Group v).
,, 29. ,, *imitator* (Group v).
,, 30. ,, *hypomelas rubrostriata* (Group v).

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EXPLANATION OF PLATE II.

GENITALIA OF *Delias*.

The Uncus.

All drawings are made to the same magnification.
The dotted line indicates the approximate point of attachment of the scaphium.

Fig. 31. *Delias heroni* (Group v).
,, 32. ,, *itamputi* (Group v).
,, 33. ,, *nigropunctata* (Group v).
,, 34. ,, *thompsoni* (Group v).
,, 35. ,, *cuningputi fascelis* (Group v).
,, 36. ,, *pheres* (Group v).
,, 37. ,, ,, *approximata* (Group v).
,, 38. ,, *aroae* (Group v).
,, 39. ,, *fuliginosus* (Group v).
,, 40. ,, *eichhorni frater* (Group vi).
,, 41. ,, *carstenziana* (Group vi).
,, 42. ,, *leucobalia distincta* (Group vi).
,, 43. ,, *catisa* (Group vi).
,, 44. ,, *castaneus* (Group vii).
,, 45. ,, *pratti* (Group vii).
,, 46. ,, *caroli* (Group vii).
,, 47. ,, *bornemanni* (Group vii).
,, 48. ,, *nais denigrata* (Group vii).
,, 49. ,, *iltis* (Group viii).
,, 50. ,, *mesoblema* (Group viii).
,, 51. ,, *bakeri* (Group viii).
,, 52. ,, *callista* (Group viii).
,, 53. ,, *hapalina* (Group ix).
,, 54. ,, ,, *conspectirubra* (Group ix).
,, 55. ,, *campbelli* (Group ix).
,, 56. ,, *phippsi* (Group ix).
,, 57. ,, *weiskei* (Group ix).
,, 58, ,, *callima* (Group ix).
,, 59. ,, *marguerita* (Group ix).
,, 60. ,, *kummeri* (Group x).

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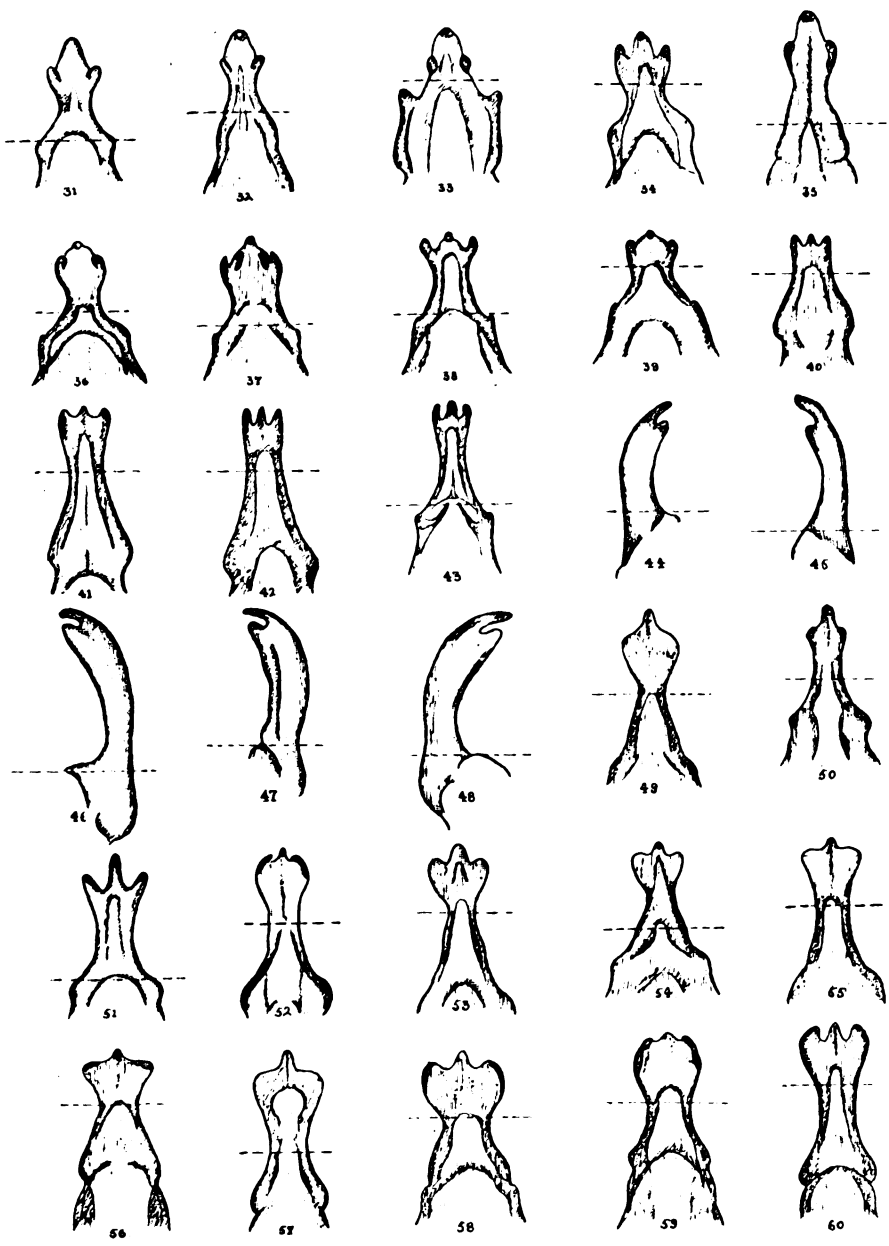

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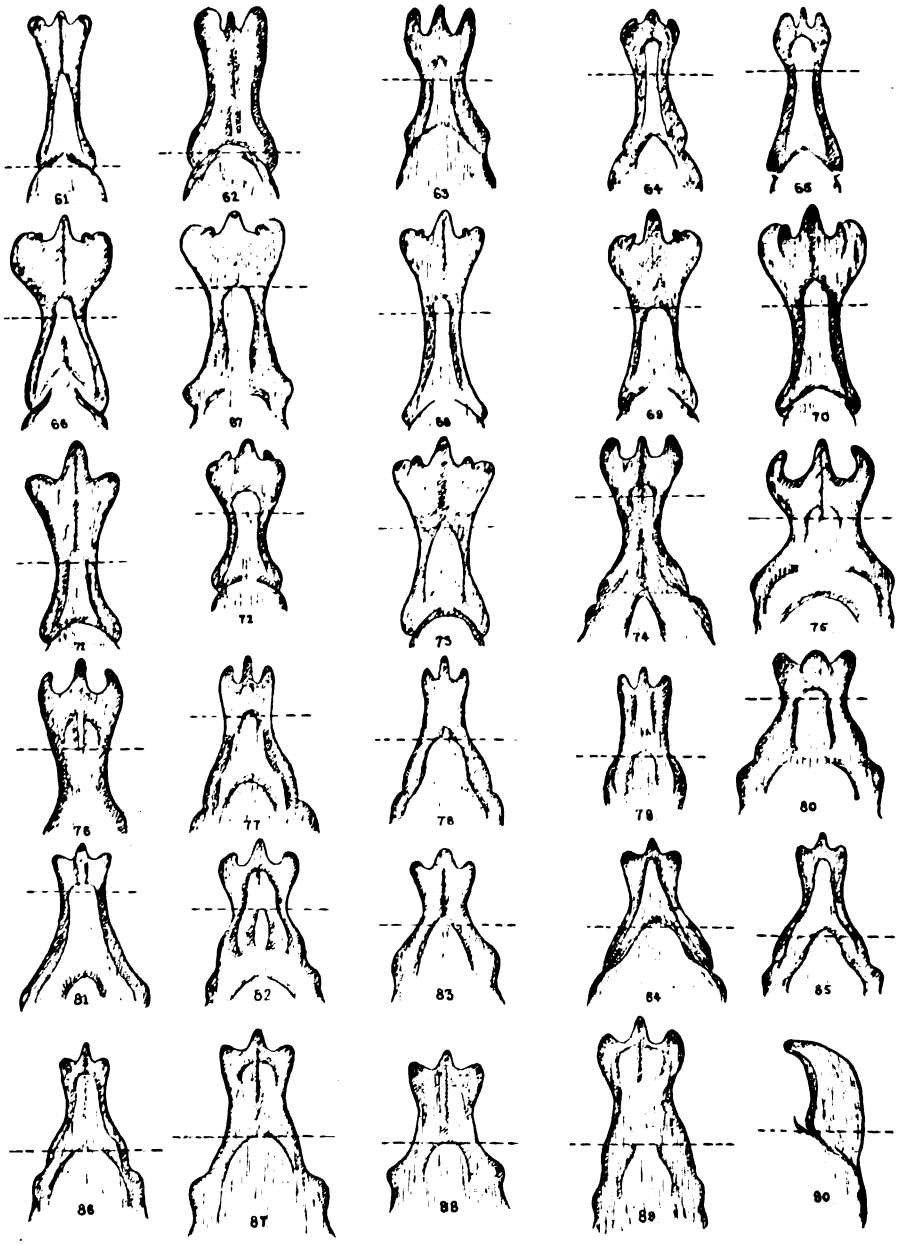

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EXPLANATION OF PLATE III.

GENITALIA OF *Delias*.

The Uncus.

All drawings are made to the same magnification.

The dotted line indicates the approximate point of attachment of the scaphium.

Fig. 61. *Delias ligata* (Group x).
„ 62. „ *isocharis latiapicalis* (Group x).
„ 63. „ *alepa kunupiensis* (Group x).
„ 64. „ *dixeyi* (Group x).
„ 65. „ *bothwelli* (Group x).
„ 66. „ *joiceyi* (Group xi).
„ 67. „ *dohertyi knowlei* (Group xi).
„ 68. „ *prouti* (Group xi).
„ 69. „ *eximia* (Group xi).
„ 70. „ *duris* (Group xi).
„ 71. „ *funerea buruana* (Group xi).
„ 72. „ *nigrina* (Group xi).
„ 73. „ *persephone* (Group xi).
„ 74. „ *patrua* (Group xii).
„ 75. „ *lativitta* (Group xii).
„ 76. „ *wilemani* (Group xii).
„ 77. „ *berinda* (Group xii).
„ 78. „ *belladonna ithiela* (Group xii).
„ 79. „ *henningia ochreopicta* (Group xiii).
„ 80. „ „ *ottonia* (Group xiii).
„ 81. „ „ *pandemia* (Group xiii).
„ 82. „ *crithoe* (Group xiii).
„ 83. „ *bromo* (Group xiii).
„ 84. „ *aglaia* (Group xiii).
„ 85. „ „ *parthenope* (Group xiii).
„ 86. „ „ *egialea* (Group xiii).
„ 87. „ *thysbe pyramus* (Group xiii).
„ 88. „ *ninus* (Group xiii).
„ 89. „ „ *parthenia* (Group xiii).
„ 90. „ *albertisi* (Group xiv).

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EXPLANATION OF PLATE IV.

GENITALIA OF *Delias*.

The Uncus.

All drawings are made to the same magnification.

The dotted line indicates the approximate point of attachment of the scaphium.

Fig. 91. *Delias discus* (Group xiv).
,, 92. ,, *elongatus* (Group xv).
,, 93. ,, *clathrata* (Group xv).
,, 94. ,, *catocausta* (Group xv).
,, 95. ,, *mira* (Group xv).
,, 96. ,, *mariae menooensis* (Group xv).
,, 97. ,, *meeki neagra* (Group xvi).
,, 98. ,, *meeki albimarginata* (Group xvi).
,, 99. ,, *meeki meeki* (Group xvi).
,, 100. ,, *niepelti* (Group xvi).
,, 101. ,, *descombesi* (Group xvii).
,, 102. ,, ,, *oraia* (Group xvii).
,, 103. ,, *belisama glauce* (Group xvii).
,, 104. ,, *zebuda* (Group xvii).
,, 105. ,, *eumolpe* (Group xvii).
,, 106. ,, *madetes* (Group xvii).
,, 107. ,, *diaphana* (Group xvii).
,, 108. ,, *ellipsis* (Group xvii).
,, 109. ,, *aganippe* (Group xvii).
,, 110. ,, *harpalyce* (Group xvii).
,, 111. ,, *agostina* (Group xviii).
,, 112. ,, *subviridis* (Group xviii).
,, 113. ,, *dorylaea* (Group xviii).
,, 114. ,, *dorimene* (Group xviii).
,, 115. ,, *apatela* (Group xviii).
,, 116. ,, *echidna* (Group xviii).
,, 117. ,, *rothschildi* (Group xviii).
,, 118. ,, *biaka* (Group xviii).
,, 119. ,, *narses* (Group xviii).
,, 120. ,, *gabia aurantimacula* (Group xviii).

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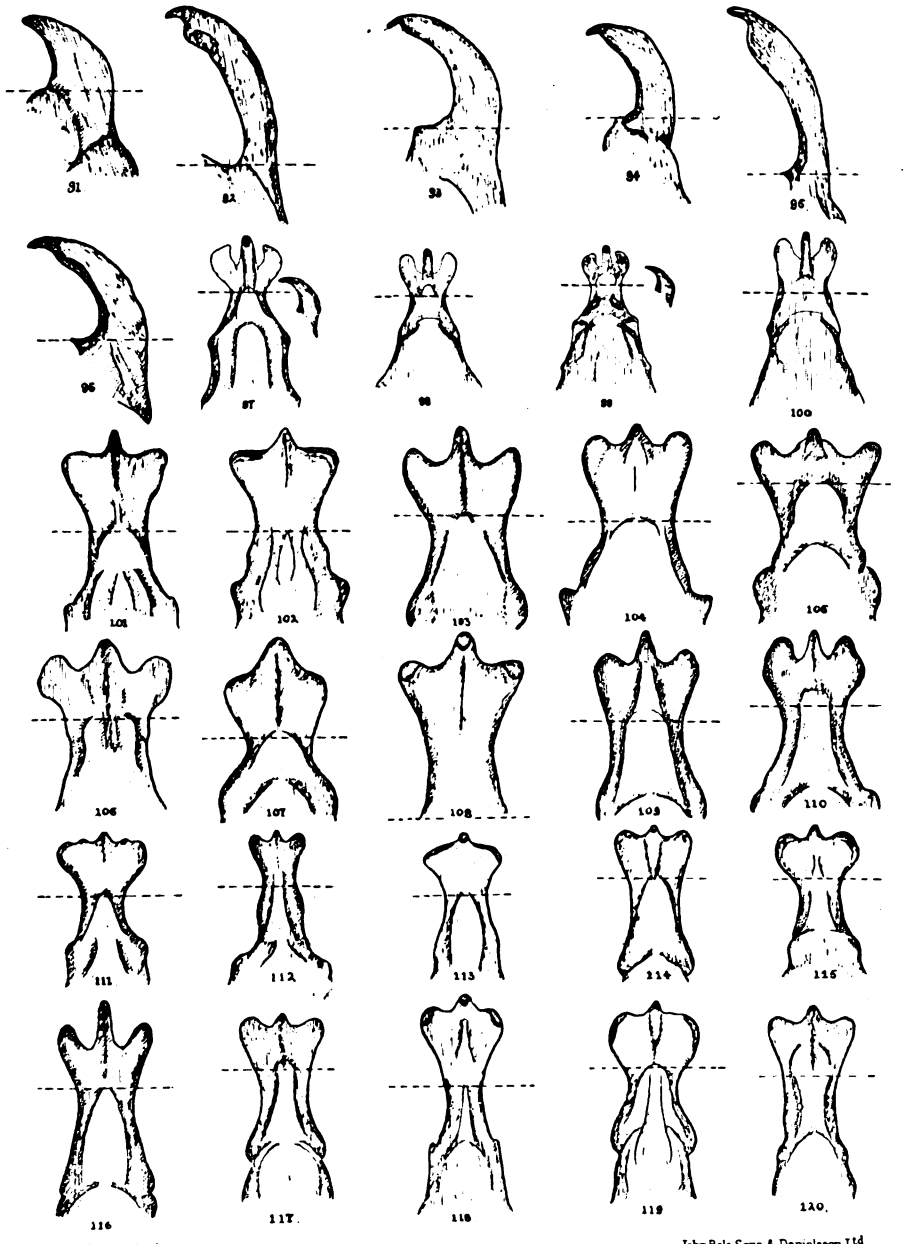

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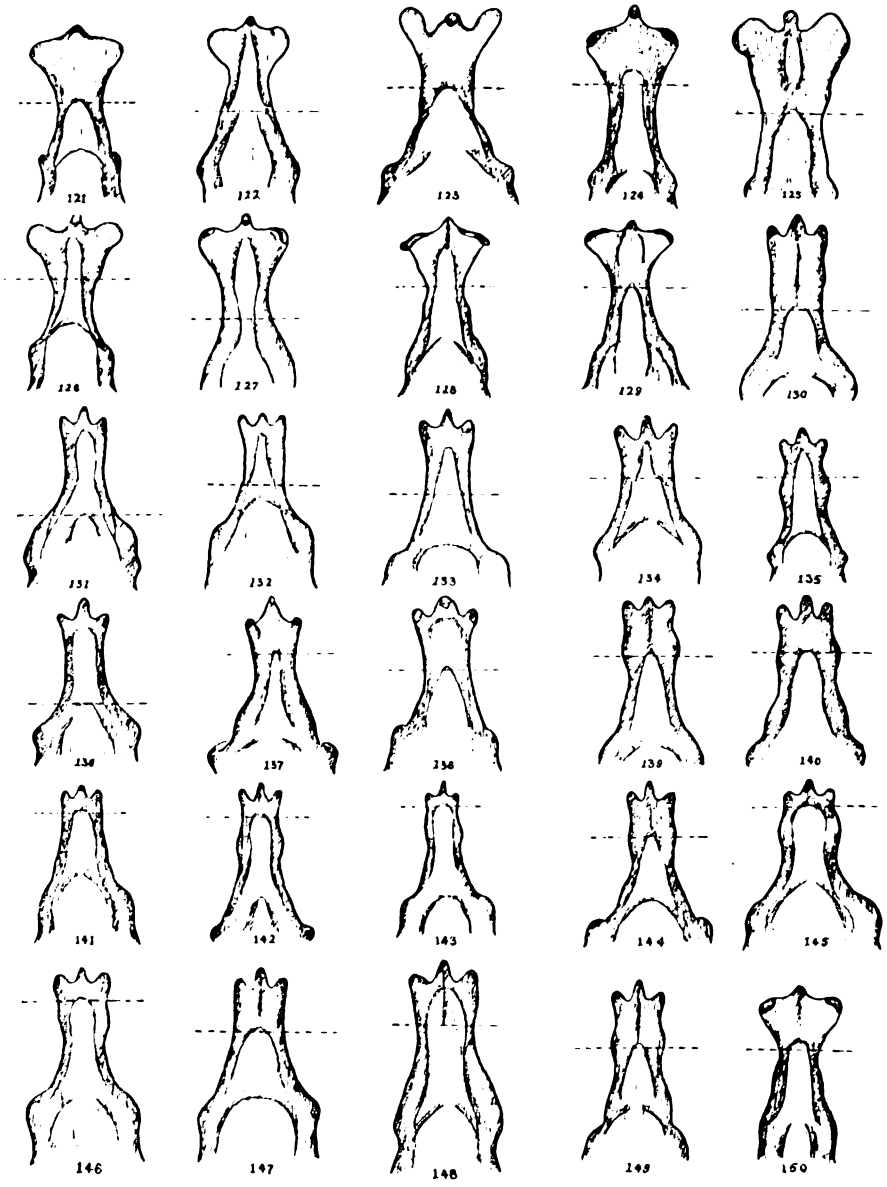

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EXPLANATION OF PLATE V.

GENITALIA OF *Delias*.

The Uncus.

All drawings are made to the same magnification.

The dotted line indicates the approximate point of attachment of the scaphium.

Fig. 121. *Delias gabia zarate* (Group xviii).
„ 122. „ *omissa* (Group xviii).
„ 123. „ *alberti* (Group xviii).
„ 124. „ *isse* (Group xix).
„ 125. „ *candida* (Group xix).
„ 126. „ *bosnikiana* (Group xix).
„ 127. „ *ennia nigidius* (Group xix).
„ 128. „ *multicolor* (Group xix).
„ 129. „ *lytaea* (Group xix).
„ 130. „ *eucharis* (Group xx).
„ 131. „ *hyparete indica* (N. India) (Group xx).
„ 132. „ „ „ (Burma) (Group xx).
„ 133. „ *rosenbergi lorquini* (Group xx).
„ 134. „ *mitisi* (Group xx).
„ 135. „ *periboea* (Group xx).
„ 136. „ *fasciata* (Group xx).
„ 137. „ *sumbawana* (Group xx).
„ 138. „ *poecilea* (Group xx).
„ 139. „ *caeneus* (Group xx).
„ 140. „ „ *philotis* (Group xx).
„ 141. „ *mysis* (Group xx).
„ 142. „ „ *intermedia* (Group xx).
„ 143. „ „ *cruentata* (Group xx).
„ 144. „ *euphemia* (Group xx).
„ 145. „ *salvini* (Group xx).
„ 146. „ *bagoe* (Group xx).
„ 147. „ *schoenbergi* (Group xx).
„ 148. „ „ *isabellae* (Group xx).
„ 149. „ *argenthona* (Group xx).
„ 150. „ *ennia* (Group xix).

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EXPLANATION OF PLATE VI.

GENITALIA OF *Delias*.

The Lamina Dentata.

All drawings are made to the same magnification, but No. 14 is reduced by half.

Fig. 1. *Delias manuselensis* (Group ii).
,, 2. ,, *hyparete niasana* (Group ii).
,, 3. ,, *dice mitisana* (Group xx).
,, 4. ,, *periboea* (Group xx).
,, 5. ,, *stresemanni* (Group iv).
,, 6. ,, *subviridis* (Group xviii).
,, 7. ,, *talboti* (Group iii).
,, 8. ,, *gabia* (Group xviii).
,, 9. ,, *descombesi* (Group xvii).
,, 10. ,, *thysbe pyramus* (Group xiii).
,, 11. ,, *agostina* (Group xviii).
,, 12. ,, *nigrina* (Group xi).
,, 13. ,, *ladas levis* (Group iii).
,, 14. ,, *subnubila* (Group xii).
,, 15. ,, *enniana contracta* (Group ii).
,, 16. ,, *dohertyi knowlei* (Group xi).
,, 17. ,, *catisa* (Group vi).
,, 18. ,, *aganippe* (Group xvii).
,, 19. ,, *imitator* (Group v).
,, 20. ,, *aroae yabensis* (Group v).
,, 21. ,, *pheres approximata* (Group v).
,, 22. ,, *crithoe* (Group xiii).
,, 23. ,, *albertisi* (Group xiv).
,, 24. ,, *mariae menooensis* (Group xv).
,, 25. ,, *ninus parthenia* (Group xiii).
,, 26. ,, *henningia* (Group xiii).
,, 27. ,, *belisama* (Group xvii).
,, 28. ,, *aglaia* (Group xiii).
,, 29. ,, *aruna* (Group xvii).
,, 30. ,, *zebuda* (Group xvii).
,, 31. ,, *euphemia* (Group xx).
,, 32. ,, *caeneus* (Group xx).
,, 33. ,, *argenthona* (Group xx).

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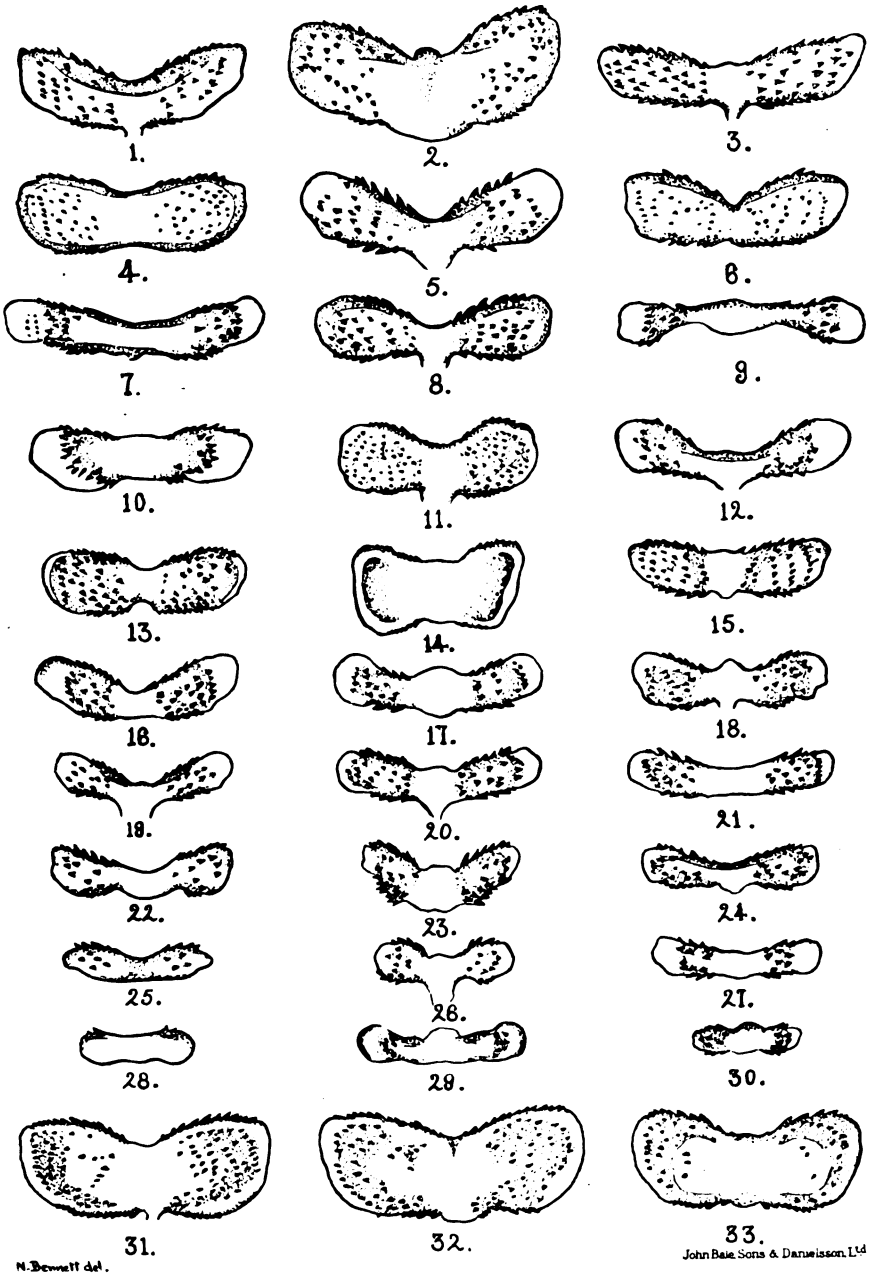

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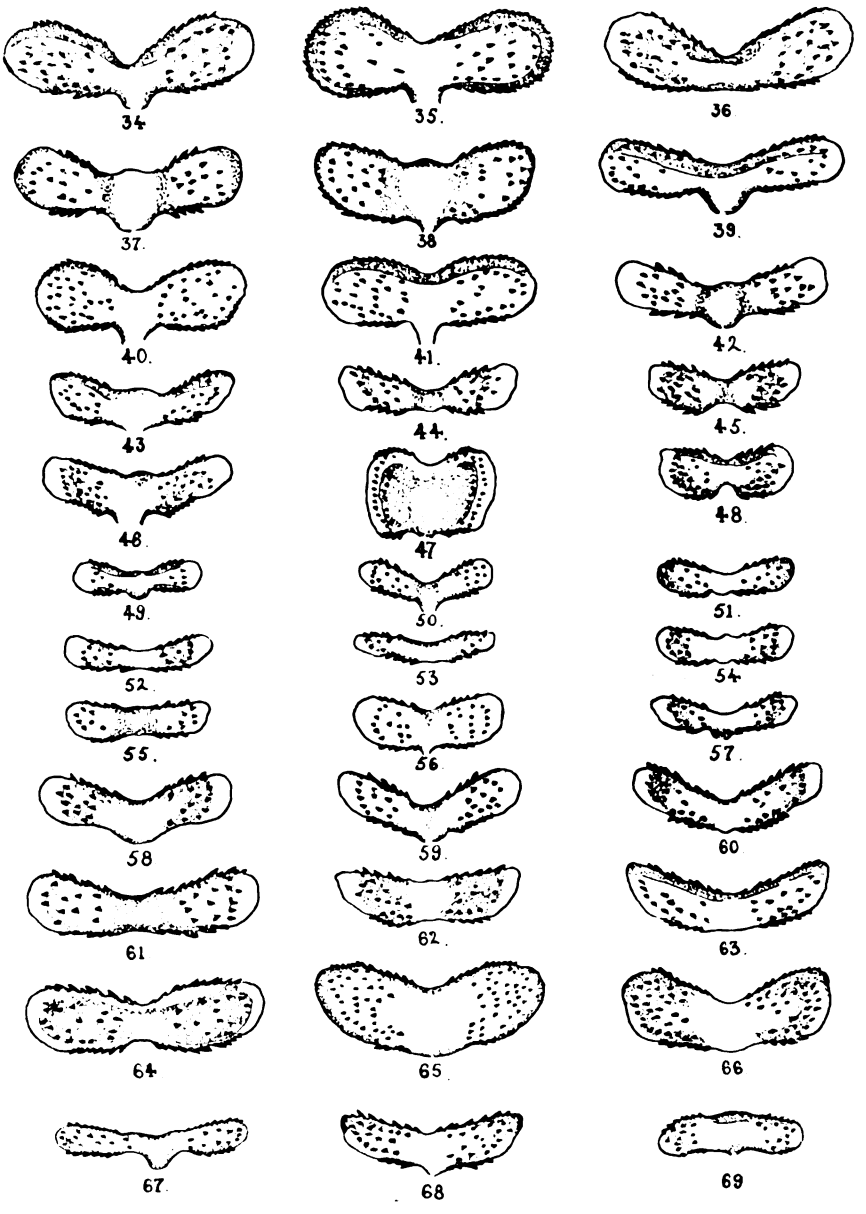

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EXPLANATION OF PLATE VII.

GENITALIA OF *Delias*.

The Lamina Dentata.

All drawings are made to the same magnification, but No. 47 is reduced by half.

Fig. 34. *Delias isse* (Group xix).
„ 35. „ *rothschildi* (Group xviii).
„ 36. „ *echidna* (Group xviii).
„ 37. „ *joiceyi* (Group xi).
„ 38. „ *mysis* (Group xx).
„ 39. „ *dorimene* (Group xviii).
„ 40. „ *biaka* (Group xviii).
„ 41. „ *ennia* (Group xix).
„ 42. „ *duris* (Group xi).
„ 43. „ *discus* (Group xiv).
„ 44. „ *bornemanni* (Group vii).
„ 45. „ *alepa kunupiensis* (Group x).
„ 46. „ *harpalyce* (Group xvii).
„ 47. „ *berinda adelma* (Group xii).
„ 48. „ *castaneus* (Group vii).
„ 49. „ *bakeri* (Group viii).
„ 50. „ *hypomelas rubrostriata* (Group v).
„ 51. „ *caroli* (Group vii).
„ 52. „ *nais denigrata* (Group vii).
„ 53. „ *meeki albimarginata* (Group xvi).
„ 54. „ *isocharis latiapicalis* (Group x).
„ 55. „ *campbelli* (Group ix).
„ 56. „ *hapalina conspectirubra* (Group ix).
„ 57. „ *ornytion persephone* (Group xi).
„ 58. „ *schmassmanni* (Group iv).
„ 59. „ *microsticha* (Group v).
„ 60. „ *eschatia* (Group ii).
„ 61. „ *totila* (Group iii).
„ 62. „ *georgina battana* (Group ii).
„ 63. „ *nysa* (Group ii).
„ 64. „ *singhapura indistincta* (Group i).
„ 65. „ *eucharis* (Group xx).
„ 66. „ *timorensis gardineri* (Group xx).
„ 67. „ *crithoe tobahana* (Group xiii).
„ 68. „ *momea* (Group ii).
„ 69. „ *belisama glauce* (Group xvii).

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MONOGRAPH

OF THE

PIERINE GENUS *Delias*

BY

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8 (22). **D. DUMASI** Roths. (1925) (pl. xxxvii, fig. 8).

Delias dumasi Rothschild **182**, p. 671, ♀ (Buru).

This specimen bears a remarkable resemblance on the hind wing below to *rothschildi* Holl. and *apatela* J. and T., two species also found in Buru but which are less closely allied to *dumasi* than to one another.

♀ (Original description).

"Above differs from *apatela* and *rothschildi* in the almost entirely brown-black fore wings, the basal ⅓ being only faintly freckled with paler scales, a little more thickly below vein 1. On the hind wing the colour is buffish-cream, *not* greyish-white; the inner margin of the black outer two-fifths of the hind wing is deeply indented and crenulated, *not* straight. Below the fore wing differs in having the first three of the five apical spots brightly yellow, *not* white, and in having a white quadrate spot between veins 8 and 9 at the end of the cell; the hind wing differs in the black marks in outer quarter being heavier and wider, and in being clear yellow with no orange or brownish suffusion, nervures white.

"Expanse 74 mm. Length, fore wing 35 mm.

"*Habitat.*—One ♀, Mount Mada, Buru, 3,000 feet, Sept. 1898 (Dumas coll.)."

Type in Mus. Tring. No other specimen known.

9 (23). **D. VIDUA** J. and T. (1922).

Delias vidua Joicey and Talbot **108**, p. 304 (Buru), ♀; **109**, p. 27, ♂; **110**, p. 511, pl. vii, fig. 8 ♂, 9 ♀.

,, ,, J. and T., Rothschild **182**, p. 674.

This species is distinguished by the black-brown apical half of fore wing and by the similarly coloured hind wing below bearing small yellow submarginal spots, and with basal area dusted with yellow.

(Original description).

"♂. Upperside white. Fore wing with broad black apical area and costa narrowly black. Hind wing with broad black distal area, in cellules 2 and 3 with indistinct triangular prolongations. The black dusting along the edge of the white area is more uniform but less strongly present than in *isse echo*. Underside with fuscous-black ground-colour. Fore wing with apical area somewhat as in *echo* but broader; proximal area pale yellow, paler still posteriorly. Five small

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submarginal spots in 3, 4, 5, 6 and 8, the two anterior ones the larger. Hind wing with a submarginal series of six yellow spots, the one in 6 the larger, the others uniform and somewhat linear. Base to near middle of cell and cellule 8 dusted with yellow, inner margin yellow.

"Length of fore wing: 33 mm.

"The ♀ presents a curious resemblance to that sex of *isse echo* Wall.

"♀. Upperside of fore wing with white area more extended than in *echo*, reaching the end of cell, and curving outwards by the origin of vein 4 to the tornus. Hind wing with white basal half reaching beyond the cell.

"Underside of fore wing with sharply-defined yellowish-white areas as above. Five pale yellow submarginal dots, those in 2 and 4 farther from the margin than in *echo*. Hind wing with basal yellow area not well defined, but reaching base of vein 6. Submarginal series of yellow spots placed a little farther from the margin than in *echo*.

"Length of fore wing, 34 mm."

Scent-scale (pl. xviii, fig. 7).

Narrow, base almost straight.

Genitalia:—

Valve (plate viii, fig. 8). Distal edge with a short, narrow and rounded process. Dorsal edge nearly straight and slightly excurved posteriorly. Ventral fold broad, with a sclerotized proximal edge. Cavity of moderate size.

Uncus (plate i, fig. 5). Belongs to the type of Group 6. Middle lobe smaller and widely separated from the outer lobes. Accessory lobe small and rounded. Tegumen constricted below the middle.

Habitat.—Buru. Type ♀ taken by W. J. C. Frost, in October, 1918; ♂ neallotype taken by Pratt brothers at the River Pohatiga, 3,000 feet, April. Both in Hill Mus. Also in Mus. Tring four ♂♂, taken at Kayeli, March, 1897, by W. Doherty.

We have seen no other specimens.

10 (24). D. ESCHATIA J. and T. (1923).

Delias eschatia Joicey and Talbot **109**, p. 27 (Buru), ♂ ♀; **110**, p. 510, pl. vi, figs. 3 ♂, 4 ♀.

This species is distinguished on the underside by the smoky-brown

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hind wing bearing a row of small yellow submarginal spots, and on the upperside by the ♂ hind wing bearing a narrow black-dusted marginal border.

(Original description, revised 1924).

" ♂. Upperside white. Fore wing with costa narrowly black, but broadening towards the black apex. Four small white subapical spots contingent upon the white area. Hind wing white but with dark underside showing through. Outer margin with a thin black line and black fringe. A narrow marginal border of black dusting. Underside of fore wing white, with broader costal and apical fuscous than above. Four yellowish-white subapical spots. Base dusted with yellow. Hind wing fuscous. Cellule 8 dusted with yellow, also the inner margin. A submarginal row of six dark yellow spots.

" ♀. Upperside of fore wing white. A broad costal and apical black area with five white subapical spots. Hind wing grey-white with a broad black outer margin, narrowing posteriorly. Underside as in ♂, but fore wing with broader apical black and larger spots.

" Length of fore wing, ♂ ♀, 30 mm."

Scent-scale (pl. xviii, fig. 8).

Rather distinct from the other species of the group. Shorter, posteriorly much broader with an almost flat base, and no apparent central core. Disk smaller than in allied species.

Genitalia :—

Valve (pl. viii, fig. 9). Distal edge with a short and moderately broad finger-like process. Dorsal edge incurved, excurved posteriorly. Ventral fold broad, with a chitinized proximal edge. Cavity of moderate size.

Uncus (pl. i, fig. 6). Type of Group 6. Middle lobe much narrower than the outer lobes and about equal in length to them. Accessory lobe long and narrow. Tegumen constricted below the middle.

Lamina dentata (pl. vii, fig. 60). Moderately long and narrow, bent outwards, the distal ends rounded. Middle of anterior margin narrow and concave, of the posterior margin slightly convex. Teeth strongly developed, not reaching the distal margins. Length, *circ.* 1 mm.; breadth, *circ.* 1 mm.

Habitat.—Buru. Described from two ♂ ♂, four ♀ ♀, taken by the brothers Pratt at Koentoeroen, 3,500 feet, April. Also from Gamoe 'Mrapat, 5,000 feet, April, one ♂; Kako Tagalago, 2,700 feet, May,

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two ♂♂; Lek Sula, coast district, February-March, one ♀. Types in Hill Mus.

11. D. MANUSELENSIS Talb.

This species, whilst resembling *eschatia* on the hind wing below, has large white submarginal spots on the fore wing below, in the ♀ on both sides. The ♂ is white above, hind wing without a marginal border, fore wing with a narrow black outer margin. ♀ with broad black apical area on fore wing, and hind wing with broad black marginal border bearing large white marginal spots.

Habitat.—Ceram and Amboina. Two races known.

11A (25). *D. manuselensis manuselensis* Talb. (1920) (pl. xxxviii, figs. 1, 2).

Delias manuselensis Talbot, **221**, p. 402, pl. xix, figs. 13, 14 ♂, 15-17 ♀.

(Original description).

" ♂. Upperside: Fore wing white; costa narrowly edged with black, outer margin narrowly bordered with black from apex to vein 3, distal ends of veins 2—7 black. Hind wing white.

Underside: Fore wing white; apex and outer margin broadly dull purplish-bronze to below vein 2, and bearing near the margin a row of six white spots; the anterior two or three spots are tinged with yellow, all are rounded, the upper three being more ovate, the lower spot much smaller than the others; the distal margin of the dark area is invaded by white in cellule 4; costa narrowly purplish-bronze; some grey and yellow scaling at the base. Hind wing deep purplish-bronze; a submarginal series of six pale yellow spots which are rounded and slightly pointed distally, their points sometimes touching the margin; cellule 8 powdered with yellow; inner margin to the submedian sparsely powdered with yellow; a white discal spot formed of some loosely placed white scales along the outer edge of the lower discocellular.

" Head grey-black; palpi black, with black and white hair; antennae black; thorax black, with grey hair above and below, sides with some yellow hair; abdomen black, powdered with white, especially at sides and on ventral surface, claspers white.

" ♀. Upperside: Fore wing white with blackish-brown apical half; costa narrowly black; base greyish to vein 2 and merging anteriorly into the outer greyish powdering of the apical area; apical area reaching to the submedian and bearing a series of six submarginal white spots, the fourth and fifth the larger, and the sixth smaller; the greyish

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powdering distally cuts off a white patch outside the end of cell, this patch being indented distally, its lower part forming a tooth in cellule 4. Hind wing grey, formed by a thin layer of white scales on a blackish-brown ground; this colouring is darker distally and leaves a more or less extent of black ground-colour in the distal area; a narrow marginal border of grey-white, deeply crenulate on its inner edge.

"Underside: Fore wing as above, but dark apical half more sharply defined; base powdered with grey along costa and below the cell, base of cell powdered with yellow. Hind wing as in the ♂.

"Head and appendages, thorax, and abdomen as in ♂.

"Length of fore wing, ♂ 26-29, ♀ 26-31 mm.

"*Habitat.*—Central Ceram, Mount Manusela, 6,000 feet, October and November.

"Described from five ♂♂ and seven ♀♀."

Scent-scale (pl. xviii, fig. 9).

Moderate in length, broad posteriorly but narrower at the base; base strongly concave.

Genitalia:—

Valve (pl. viii, fig. 10). Distal edge with a broad and moderately long finger-like process. Dorsal edge incurved, excurved posteriorly. Ventral fold narrow posteriorly, with a well-defined proximal edge. Cavity large.

Uncus (pl. i, fig. 7). Type of group 6. Middle lobe narrower and longer than the outer lobes. Accessory lobe small and narrow. Tegumen constricted at and below the middle.

Lamina dentata (pl. vi, fig. 1). Long and moderately broad, distal ends oblique. Anterior margin broadly incurved at the middle. Posterior margin slightly excurved at the middle. Teeth strongly developed, fewer on the posterior margin, and not reaching the distal margins.

Length = *circ.* 1·2 mm., breadth *circ.* 0·2 mm.

Habitat.—Ceram, Mount Manusela, 6,000 feet, October and November, collected by the brothers Pratt. Also obtained at 3,000 feet in October and November, and at 4,000 feet in January.

Types in Hill Museum.

A ♀ taken at 6,000 feet has more extended white on both wings, but on the hind wing the marginal spots are not formed, and there is a continuous white marginal border with a broadly corrugate edge.

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11B (26). *D. manuselensis brooksi* J. and T. 1925).

Delias manuselensis brooksi Joicey and Talbot 111, p. 636, (Amboina) ♂ ♀.

(Original description).

" ♂. Larger than the Ceram form. Upperside of fore wing with the black margin broader. Underside of fore wing with perhaps no constant difference, but a tendency to larger spots and to a more distinct prolongation of the white area into cellule 4. Hind wing with the spots paler yellow, which is not due to the wing being worn.

" ♀. Much darker than the typical form. Upperside of fore wing with broader black and the basal grey more extended. Hind wing entirely suffused with grey; white spots tinged with yellow proximally. Underside of fore wing with the dark areas broader and more pronounced, cell nearly filled with yellow; some grey suffusion terminating in a strong black irregular subapical spot. Hind wing with increased basal yellow, and marginal spots darker yellow than in the ♂.

"*Habitat.*—Amboina; Salahator, 2,000 metres, November, 1923, four ♂ ♂, one ♀ taken by C. J. Brooks. The ♀ is in the coll. Brooks, and we are indebted to him for notes upon it compared with a Ceram ♀. Type ♂ in Hill Mus.

"It is remarkable that this species remained for so long undiscovered in the well-known and comparatively small island of Amboina."

12 (27). D. **WATERSTRADTI** Roths. (1915) (pl. xxxviii, fig. 3).

Delias waterstradti Rothschild 180, p. 175 (Halmaheira) ♂.

The canary-yellow upperside and the large golden-yellow submarginal patches on the hind wing below distinguish this species from any other, but the underside pattern is very similar to *kühni* and *themis*.

(Original description).

" ♂. Above canary-yellow tinged with green; apex and costal area of fore wing and margin of hind wing brown. Below, fore wing black-brown, cell densely and rest of basal half of wing sparsely powdered with golden-yellow; beyond cell and along nervures the yellow powdering is more densely present, almost appearing like a band of yellow patches; a subapical band of large golden-yellow patches. Hind wing, basal three-fifths golden-yellow, powdered in basal half with sooty-black; outer two-fifths black-brown, with submarginal row of large golden-yellow patches.

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" Length of fore wing, 34 mm.

" *Habitat.*—Halmaheira (Waterstradt)."

Type ♂ in Mus. Tring. No other specimens known.

13. D. MOMEA Bdv.

A smaller species than the preceding ones. Upperside white with a black apical area bearing five small submarginal spots on the fore wing. Hind wing with a narrow black or grey-black marginal border. Underside of fore wing with some proximal yellow, hind wing fuscous-brown with small yellow submarginal spots. The ♀ has broader black margins with submarginal spots on the hind wing above. Fore wing below with more extended proximal yellow area.

Distribution.—Sumatra and Java. Three races known.

13A (28). *D. momea hageni* Rogenh. (1892).

Delias hageni Rogenhofer **172**, p. 572 (N.E. Sumatra) ♂.
,, ,, Rog., Mitis **137**, pp. 113, 151, pl. 3, fig. 5 ♂.
,, ,, Rog., Hagen **84**, p. 34, **85**, p. 157.
Delias momea hageni Rog., Fruhstorfer **68**, p. 129.
Delias datames de Nicéville **149**, p. 53, pl. 1, fig. 8; **148**, p. 557 (Battak Mtns., Sumatra), ♂; **151**, p. 489.

♂. Upperside resembles *Huphina nadina fawcetti* Butl., which it also resembles on the hind wing below. Both *Delias* and *Huphina* fly together.

Fore wing with black distal area usually reaching the end of the cell and narrowing to the submedian. A subapical row of five small white spots, of which the one in 3 is smaller and nearer the margin than the others. Costal margin to the cell, black to the base. Hind wing with a black-dusted marginal border which is not well-defined and is about 5 mm. broad.

Underside of fore wing with lemon-yellow proximal half except along the inner margin which is white. Distal half fuscous-brown with spots as above, the two anterior ones yellow and sometimes a small spot in 2 near the margin. Hind wing fuscous-brown, yellow at base of costa. A row of six rather small yellow submarginal spots. Some indistinct yellow postdiscal dusting between the submedian and vein 5.

Length of fore wing, *circ.* 26 mm.

♀ unknown.

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Habitat.—N. E. Sumatra: Battak Mtns., June.

We do not know the whereabouts of the type. Type of *datames* in coll. Martin, probably in Mus. Munich.

Genitalia:—

Valve (pl. viii, fig. 11). Distal edge with a broad and rounded finger-like process. Dorsal edge slightly incurved, excurved posteriorly. Ventral fold well sclerotized, and narrowing posteriorly. Cavity not seen.

Uncus. Type of Group 6. Outer lobes broad and with rounded outer edge. Middle lobe narrow and curved inward. Accessory lobes rounded and well developed, forming a prominent shoulder. Tegumen strongly excurved at the middle.

13B (29). *D. momea huphinoides* J. and T. (1925) (pl. xxxviii, fig. 6).

Delias momea huphinoides Joicey and Talbot **111**, p. 635 (S. W. Sumatra), ♂ ♀.

(Original description).

"This form closely resembles on the upperside the ♂ *Huphina nadina fawcetti* Butl., found in the same district, and of which a small series was taken flying with the *Delias*.

"♂. Upperside of fore wing without spots in one specimen, and with traces of these in another, the white proximal area not extending definitely beyond the cell, only as some slight white powdering. Hind wing more strongly dusted with black than in *hageni* Rog., and with a black margin about the width of the shaded area in *hageni*.

"Underside of fore wing as in *hageni*, and with five yellowish subapical dots. Hind wing as in *hageni*, but darker brown.

"♀. Upperside of fore wing with the proximal area as in the ♂, but yellowish, the distal black area broader than in *hageni* and the submarginal spots reduced to white dots. Hind wing with black marginal border broader than in the ♂ and mostly with a series of white dots; the rest of the wing darker than in the ♂ or than in the ♀ of *hageni*. Inner margin washed with yellow. Underside as in the ♂, spots a little larger. Hind wing with an indistinct band of yellow scaling beyond the cell."

Habitat.—S.W. Sumatra: slopes of Mt. Korintji, 7,300 feet, August to September, 1921, one ♂, seven ♀ ♀ (holotype and allotype); North Korintji Valley, 3,500 feet, October, 1921, one ♂, two ♀ ♀; Korintji Peak, interior of crater, 12,400 feet, August to September, 1921, one ♀.

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All collected by Messrs. C., F., and J. Pratt. Also two ♀ ♀ from Padang-Pandjang, S. Sumatra.

With reference to the last-mentioned specimen from Korintji, the collectors note that the last traces of vegetation are found about 1,500 feet below this point.

Types in Hill Museum.

Genitalia:—

Valve (pl. viii, fig. 12). Distal edge with a broad and rounded protuberance. Dorsal edge incurved slightly anteriorly, excurved posteriorly. Ventral fold moderately broad with a defined proximal edge. Cavity not seen.

Uncus (pl. i, fig. 8). Type of Group 6. Middle lobe narrower and shorter than the outer lobes. Accessory lobe small and narrow. Tegumen constricted at and below the middle. A narrow type.

13c (30). *D. momea momea* Bdv. (1836) (pl. xxxviii, figs. 7, 8).

Pieris momea Boisduval **2**, p. 477 (Java) ♂ ♀.
,, ,, Bdv., Vollenhoven **226**, p. 31.
Thyca momea Bdv., Wallace **228**, p. 360.
,, ,, Bdv., Piepers and Snellen **161**, p. 33, pl. iii, figs. 1*a*, *b*, ♂ ♀.
Delias momea Bdv., Mitis **137**, p. 112.
,, ,, Bdv., Butler **14**, p. 166.
,, ,, Bdv., Fruhstorfer **68**, p. 129.
Scent-scale. Dixey, *Proc. Ent. Soc. Lond.*, 1909, p. cxii.

♂. Upperside of fore wing as *hageni* with black distal area and white submarginal spots, and only differing in the costa being only slightly dusted with black, and in the possession of 3 small white postcellular spots in 4, 5 and 8. Hind wing with black-dusted marginal border darker and narrower than in *hageni*, with white submarginal spots at least in cellules 3—5.

Underside of fore wing as in *hageni* but yellow proximal area edged with white and posterior white area reaching vein 2 distally. Hind wing with a complete row of postdiscal white spots which are sometimes but faintly indicated.

♀. Differs from *huphinoides* in the larger submarginal spots on the fore wing, and in possessing a row of submarginal spots on the hind wing. The black distal border of the hind wing is broader and more sharply defined, and the proximal area is whiter than in *huphinoides*.

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Underside as in the ♂, but the postdiscal spots of the hind wing usually more developed and sometimes formed into a band.

Length of the fore wing ♂ ♀, 25—29 mm.

Scent-scale (pl. xviii, fig. 10).

Narrow and of moderate length. Disk small as in *eschatia*.

Genitalia:—

Valve (pl. viii, fig. 13). Distal edge rounded and slightly produced. Dorsal edge nearly straight, excurved posteriorly. Ventral fold moderately broad with a sclerotized proximal edge. Cavity not seen.

Uncus. Type of Group 6. Middle lobe long and narrow, apex curved inward. Outer lobes broad and rounded. Accessory lobes short and rounded. Tegumen excurved at the middle, incurved below the middle.

Lamina dentata (pl. vii, fig. 68).

Narrow, distal ends oblique. Middle of anterior margin incurved, of the posterior margin excurved. Teeth strongly developed and reaching the distal margins.

Length = *circ.* 1 mm., breadth *circ.*=19 mm.

Habitat.—West Java, province of Prajangan, at from 1,500 to 1,600 metres. Not very common, occurs on Mount Gedé at 4,000 feet.

14 (31). **D. FRUHSTORFERI** Honr. (1891) (pl. xxxviii, fig. 5).

Pieris fruhstorferi Honrath **98**, p. 434, t. xv, figs. 4 ♂, 4*a* ♀ (Tengger-Gebirge, Java).

Delias fruhstorferi Honr., Mitis **137**, p. 113.

Delias momea fruhstorferi Honr., Fruhstorfer, **68**, p. 129, t. 56d.

" " " Honr., Piepers and Snellen **161**, p. 33.

This species more resembles *nysa* Fbr., but is distinguished from others of the group by the hind wing below bearing a broad white discal band and large submarginal spots.

The scent-scale is different from other species of the group, but the genitalia show much affinity, except that the valve possesses a large cavity.

♂. Upperside of fore wing almost as in *nysa* Fbr., with brownish-black costal border and distal area. The distal area is distant from the end of the cell and is angled in cellule 4 and also in 3; some indistinct submarginal spots. Hind wing with black marginal vein-spots on 2—6, and slight black dusting between them.

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Underside different to *momea* and *nysa*, and with fuscous-brown ground-colour. Fore wing with white proximal half except a dark basal area which does not reach vein 2 and is slightly mixed with yellow. Outer edge of white area rounded in the cell, not reaching the cross-veins, and from vein 4 to inner margin ill-defined and outwardly oblique. A postcellular white bar from the subcostal to vein 4. A series of seven submarginal spots of which those in 3—6 are large, the one in 4 square-shaped and near the margin, the one below it larger and projecting beyond it, the two lower spots very small, of which the lowest is represented by a short divided line. Hind wing with a broad white discal band whose edges are not sharply defined; inner edge passing through the cell and the bases of cellules 2 and 6, and slightly incurved at the middle; outer edge produced in cellule 4. Six submarginal spots white tinged with yellow, larger than in *nysa* and *momea*, somewhat triangular, their apices directed distad. Cellule 8 yellow to the base.

♀. Upperside of fore wing with white proximal half as in *momea* but outer edge more indented on veins 2 and 3. A white postcellular bar of three spots (absent in *momea* and *nysa*), and five small submarginal spots, the lower one in 3 and the third in 5 more distinct than the others. Hind wing with a broad black marginal border not so sharply-defined as in *momea*, and angled at vein 4. A grey-white marginal line produced in cellules 3—5 to form small triangular spots, and in cellule 6 to a streak. Base of fore wing and basal area of hind wing dusted with black.

Underside as in the ♂, discal band of hind wing broader.

Length of fore wing, ♂ 24—26 mm., ♀ 22—26 mm.

Scent-scale (pl. xix, fig. 11).

Shorter and broader than *momea*, and with a larger disk.

Genitalia :—

Valve (pl. viii, fig. 14). Distal edge with a broad and rounded finger-like process. Dorsal edge strongly incurved, excurved posteriorly. Ventral fold defined posteriorly. Cavity large.

Uncus (pl. i, fig. 9). Type of Group 6. Middle lobe narrower and shorter than the outer lobes. Accessory lobe small and rounded. Tegumen excurved at the middle. A narrow type.

Habitat.—East Java : Tengger Mountains, 1,800—2,100 metres; also in the Semarou Mountains. A rare species; three ♂ ♂ one ♀ in the Hill Museum.

♂ ♀ types in coll. Adams, Mus. Brit.

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15. **D. NYSA** Fbr.

A larger species than *fruhstorferi* or *momea*, and similar to the former on the upperside. Underside of fore wing very little marked with white, and with a conspicuous orange basal patch which in the ♀ extends over the proximal half.

Distribution.—Australia: New South Wales to North Queensland, in two races.

15A (32). *D. nysa nysa* Fabr. (1775) (pl. xxxviii, fig. 9).

Papilio nysa Fabricius **40**, p. 473; **41**, p. 43; **42**, p. 20; **43**, p. 195.
Pieris nysa Fbr., Godart **74**, p. 152.
,, ,, Fbr., Boisduval **1**, p. 50; **2**, p. 476.
,, ,, Fbr., Doubleday and Hewitson, **30**, p. 45.
Thyca nysa Fbr., Wallace **228**, p. 360.
,, ,, Fbr., Mitis **187**, p. 112.
Delias nysa Fbr., Butler **14**, p. 166.
,, ,, Fbr., Fruhstorfer **68**, p. 129, t. 54 f, ♀.
,, ,, Fbr., Waterhouse and Lyell **231**, p. 140, figs. 531 ♂, 532, 535, ♀.
♀. *Papilio endora* Donovan **28**, pl. 20, fig. 2.
Scales. Watson, *Mem. Litt. and Phil. Soc. Man.*, ser. 3, vol. ii, p. 70.
,, Dixey, *Proc. Ent. Soc. Lond.*, 1909, p. cxii.

♂. Upperside greyish-white. Fore wing with a black distal area which extends into the lower angle of the cell and cuts off a postcellular white bar of two large spots in 4 and 5 and sometimes a third one in 8. Edge of distal area oblique from vein 4 to below vein 2. Submarginal white spots larger than in the allied species, the one in 3 somewhat square and larger than the others, the ones in 2 and 4 smaller than the others. Hind wing with a black-dusted marginal border bearing indistinct submarginal spots in 3—5, and sometimes a small one in 2 and 1c; the spot in 3 is larger than the others; there are slight prolongations from the dark border between the veins, more noticeable in 2 and 3.

Underside deep brown. Fore wing with a large orange patch in the base of cell, beyond which is a white stripe not reaching end of cell. Area below vein 2 white, reaching the outer margin at the submedian; a suffused white stripe in basal half of cellule 2, and slight white scaling in base of 3. Three small white postcellular spots. Four small white subapical spots, a larger submarginal spot in 3, and white submarginal

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point in 2, nearer the margin. Hind wing with basal half of costa orange, and six small orange submarginal spots placed well away from the margin. A small white spot on the middle discocellular.

♀. Upperside resembling *momea*. White proximal area only just entering the base of cellule 3, more indented on the submedian and vein 2 than in *momea*, and its edge less well-defined. Submarginal spots larger than in the allied species, the ones in 2 and 4 smaller than the others, or the one in 4 as large as the anterior spot. Slight black basal dusting. Hind wing darker grey than in *momea*, and the edge of the broad black marginal border less sharply defined and only defined as far as vein 3. Submarginal spots larger than in *momea* and placed nearer the margin, sometimes extended to the margin.

Underside of fore wing with proximal area between upper edge of cell and submedian orange, which together with the posterior white area is shaped as on the upperside. The ground colour is black between the proximal area and the submarginal spots, and deep brown between the outer edges of the submarginal spots and the margin. Two small grey postcellular spots in 5 and 8; submarginal spots better defined than above. Hind wing as in the ♂.

Length of fore wing, ♂ 27—30 mm., ♀ 28—29 mm.

Scent-scale (pl. xix, fig. 12).

Moderately long and narrow, disk large.

Genitalia:—

Valve (pl. viii, fig. 15). Distal edge with a broad and rounded finger-like process. Dorsal edge strongly incurved, posteriorly excurved and rounded. Ventral fold moderately broad, with defined proximal edge.

Uncus (pl. i, fig. 10). Type of Group 6. Middle lobe narrower than the outer lobes and of about equal length. Accessory lobes small and rounded. Tegumen excurved at the middle. A small type.

Lamina dentata (pl. vii, fig. 63). Moderately long and narrow, distal ends oblique. Middle of anterior margin narrowly incurved, of the posterior margin broadly incurved. Teeth strongly developed, not numerous and reaching the distal margins.

Length = *circ.* 1·1 mm., breadth = *circ.* 0·2 mm.

Habitat.—New South Wales to Cairns and Kuranda in Queensland. According to Waterhouse and Lyell, this form "occurs most abundantly in southern Queensland. and but sparingly around Sydney."

♂ type in Mus. Brit. (Banks' coll.).

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I am indebted to Dr. G. A. Waterhouse for the following description of the pupa of this insect. He informs me that the larva is at present unknown though it has been searched for.

Pupa.—One pupa only has been found, but certainly not on the food plant. General shape as in *D. nigrina*, but with only a short blunt anterior projection yellow, and followed by two short olive-green spines, a prominent thoracic ridge which extends towards the posterior end but does not bear spikes; subdorsally above the tips of the wing cases are three long spikes, the first and third being yellow and the centre one black; abdomen olive-green with six white spots, lateral white areas meeting across abdomen towards posterior end; anal end black with a yellowish mark; wing cases olive-brown with a prominent white blotch. This handsome pupa was found a few days before emergence.

15B (33). *D. nysa nivira* W. and L. (1914).

Delias nysa nivira Waterhouse and Lyell **231**, p. 141 (Coen).

♂. Differs from the typical form in the extended white area on the fore wing, especially below, and in the black ground-colour of the hind wing below.

♀. Differs from the typical form in the extended white area on the fore wing above, and the extended black distal area on hind wing above. Fore wing below as in the typical form; hind wing below as in the ♂.

Habitat.—North Queensland: Coen, October and November.

16. D. RIBBEI Röb.

This species begins the last section of the group, comprising four species. *Ribbei* is known only from Aru and Mysol, and is apparently represented elsewhere by *dice* Voll. It is distinguished by the well-developed subapical spots on the fore wing, almost filling the black marginal area. Hind wing below yellow to the black distal margin. This insect possesses the *dice* type of uncus, and may be possibly only a well-differentiated race of that species.

Distribution.—Aru and Mysol, in two races.

16 (34). *D. ribbei ribbei* Röb. (1886).

Delias ribbei Röber **168**, p. 46, pl. ii, fig. 3 ♂, 4 ♀ (Aru).
„ „ Röb., Mitis **137**, p. 110.
„ „ Röb., Butler **14**, p. 154.
„ „ Rob., Fruhstorfer **68**, p. 128.

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♂. Upperside white. Fore wing with grey-black outer marginal border bearing five large white submarginal spots, the anterior three larger and partly connected with the white area by white dusting. Hind wing with outer margin narrowly grey-black.

Underside of fore wing white with broad grey-black apical half, extending to costal two-thirds, end of cell and vein 4, and at the margin to just below vein 2. Submarginal spots more strongly marked than above, the two anterior ones yellow. A short white costal bar beyond the cell. Hind wing with a grey-black marginal border about 7 mm. broad, bearing six yellow submarginal spots which are narrow and are separated by the veins. Proximal area of hind wing yellow.

♀. Fore wing above with broad grey-black anterior area and white proximal area. Costa and base of cell broadly grey-black, as well as the outer margin narrowing to the tornus. The edge of this area is rounded, passing through the upper end of cell and the base of cellule 3. Submarginal spots larger than in the ♂. Hind wing white dusted with grey-black; an ill-defined broad grey-black marginal border bearing five white submarginal spots of which the two anterior ones are well-developed and the two posterior ones rather small.

Underside similar to the upper, the grey-black colour with a violet gloss. The cell of the fore wing, inner third of hind wing and submarginal spots of hind wing of a beautiful orange-yellow. The remainder of the fore wing proximal area, and the costa of hind wing white. Submarginal spots of both wings much larger than above, those of the hind wing slightly connected distally. The grey-black area of hind wing enters the cell.

Length of fore wing, ♂ *circ.* 33 mm., ♀ *circ.* 34 mm.

Habitat.—Aru. Types in Mus. Brooklyn, New York, ex coll. Neumogen. No other specimens known.

16A (414). *D. ribbei connectens* Talb. (1929) (pl. xxxviii, fig. 10).

Entomologist, lxii, p. 35 (1929) (Mysol).

(Original description).

"♂. Upperside as in *ribbei*. Fore wing below with the lower three white submarginal spots smaller, especially those in 3 and 4. The edge of the white area is less sharply-defined, and a narrow spot in 4 connects this area with the subcostal white spots. Hind wing below with the marginal band broader, at veins 3 and 4 broader than half the distance between cell and margin; submarginal spots smaller and not sharply defined."

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Habitat.—A single specimen in the Hill Museum from Mysol, foothills, 100—500 feet, October-November, 1916, wet season, W. J. C. Frost.

A slightly differentiated race.

Scent-scale as in *maudei*, with concave base, i.e., with a lateral projection.

Genitalia:—

Valve (pl. xxxvi, fig 1). Distal edge with a broad finger-like process (broken off in the single specimen). Dorsal edge almost straight, strongly excurved posteriorly. Ventral fold narrow and weakly defined. Cavity not seen.

Uncus. Type of group 6. Damaged, and therefore a description of details is unsafe.

17 (35). **D. MAUDEI** J. and N. (1915) (pl. xxxviii, figs. 11, 12).

Delias maudei Joicey and Noakes, 105, p. 179, pl. xxiii, fig. 3 ♂, 4 ♀ (Biak).

This species possesses the *enniana* type of uncus, of which it may be but a well-differentiated race.

♂. Upperside white. Fore wing with black apical and marginal area to below vein 2, bearing large white submarginal spots, the two anterior ones only separated from the ground-colour by some slight black dusting. The second anterior spot is longer than the others, which decrease in size posteriorly, are slightly pointed distally, and have straight proximal edges. There is a very small rounded spot in cellule 2. Hind wing with black marginal border from the inner angle to veins 4 or 5, about 5 mm. broad in cellule 2, its edge nebulous.

Underside of fore wing white with broader black area than above, extending costally to the base, entering the upper edge of cell and forming a broad discocellular bar. Basal half of cell pale yellow with basal black dusting. Submarginal spots larger than above, the two anterior ones yellow, the three lower ones somewhat lunulate. Hind wing with broad brownish-black marginal border extending to the end of cell at vein 4, its edge sharply defined; proximal area yellow, slightly edged with white between veins 7 and 4. Six large submarginal spots bright yellow, the anterior two placed at the margin and all separated by the veins.

♀. Upperside brownish-black, greyish over the basal areas. Fore wing with seven submarginal white spots, the anterior five distally pointed, the two posterior ones rather small and narrow. Hind wing

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with five pale yellow submarginal spots in 2—6, not well-developed, the lower one indistinct.

Underside of fore wing with white proximal area not reaching beyond end of cell but extended into base of cellule 3 and broadening below this. Basal two-thirds of cell yellow. Submarginal spots well-defined and as in the ♂ except a curved one between the submedian and vein 2. Hind wing with the dark distal area entering the end of cell, its edge not sharply-defined and marked by a discocellular spot extended from the yellow proximal area. Submarginal spots larger than in the ♂, only the anterior one placed on the margin.

Length of fore wing, ♂ 31—38 mm., ♀ 28—35 mm.

Scent-scale (pl. xix, fig. 13).

Relatively short, posteriorly broad with strongly concave base resembling *manuselensis*. Disk of moderate size.

Genitalia :—

Valve (pl. viii, fig. 16). Distal edge with a broad and rounded finger-like process, rather thickly beset with short bristles. Dorsal edge strongly incurved, and posteriorly strongly excurved and rounded. Ventral fold well sclerotized posteriorly. Cavity relatively small.

Uncus (pl. i, fig. 11). Type of Group 6. Middle lobe narrower than the outer lobes and of about equal length. Accessory lobe large and rounded. Tegumen excurved about the middle.

Habitat.—Schouten Islands, North New Guinea. Biak, June, 1914, A., C., and F. Pratt. Specimens were taken *in cop.*

Types in Hill Museum.

18. **D. ENNIANA** Ob.

Similar to *ribbei* and *maudei*. The submarginal spots on both wings, especially on the fore wing, smaller. Black marginal area on fore wing bent inward in cellule 4. Hind wing below with the anterior submarginal spot larger than the one below it. ♀ with chalky-white fore wing and creamy-white hind wing above. Blackish-brown marginal areas. Fore wing with a postcellular white bar which on the underside is sharply-defined and is continuous with the proximal white area.

Differs as follows from the very similar *dice* Voll. Hind wing below with the anterior submarginal spot much larger than the one below

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it, and other submarginal spots also more developed. Fore wing below with the edge of the marginal area strongly incurved at vein 4. In *dice* the anterior submarginal spot is not larger than the one below it and the edge of the dark area on the fore wing is only slightly incurved at vein 4. The ♀ of *dice* is distinguished by the white postcellular bar on the fore wing below, being small and either separated from the white proximal area or only joined to it by a thin line in cellule 4; on the upperside this bar is very rarely connected with the white area in cellule 3. In both sexes of *enniana* the marginal border of the hind wing extends well beyond vein 7 and its edge is oblique to the costa. In *dice* it extends but slightly beyond 7 and its edge is at right angles to the costa. Both species can also be distinguished by the uncus. In *enniana* (pl. i, fig. 12) the accessory lobe forms a shoulder, being well produced and rounded. The middle lobe is a little narrower and longer than in *dice*. In *dice* (pl. i, fig. 16), the accessory lobe is only slightly produced and the shoulder is therefore oblique. The middle lobe is slightly broader than in *dice*, and is not longer but usually shorter than the outer lobes.

Length of fore wing, ♂ 28—35 mm., ♀ 23—33 mm.

Distribution.—Mysol, Waigeu, Mefor, and Dutch New Guinea.

Five races are known.

18A (36). *D. enniana obsoleta* Roths. (1915) (pl. xxxix, fig. 1).

Delias enniana obsoleta Rothschild 180, p. 178 (Mysol) ♂.

" " " Talbot, *Entomologist*, vol. lxii, p. 35 (1929) ♀.

(Original description).

" ♂. Below differs from *en. enniana* in the subapical band of spots on fore wing being much reduced and the submarginal row of spots on hind wing being obsolescent; the marginal dark band of hind wing is also much wider.

" ♀. Upperside resembles *enniana* from Waigeu. The black costal bar on fore wing is narrower and the oblique white band beyond it is broader, especially the patches in 4 and 5, the lower of which is joined to the white area of the wing. On the hind wing below the dark marginal band is broader and its edge is only slightly incurved. Submarginal spots a little smaller."

Habitat.—Mysol Island. Type ♂ taken by Kuhn, January, 1899, Mus. Tring. Two ♀ ♀ taken by W. J. C. Frost in the foot-hills, 100—500 feet, October-November, 1916, wet season, in Hill Museum.

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18B (37), *D. enniana enniana* Ob. (1880).

Pieris enniana Oberthur **157**, p. 481, pl. iv, fig. 3 ♂ (Andai, Geelvink Bay, Dutch New Guinea).

Delias enniana kapaura ♂ (nec Roths.), Joicey & Talbot **107**, p. 63, pl. iv, fig. 1 (Arfak).

Fruhstorfer, in Seitz, makes the misleading statement that Oberthur's species was only known from Waigeu, and he figures the Waigeu race. Owing to *enniana* having been confused with *dice*, the female has never been properly described. Rothschild (180, p. 178) has described as the male of *dice* a specimen of *enniana* which is probably his *kapaura*.

♂. Upperside white. Fore wing with black marginal border about 11 mm. broad on the costa, narrowing posteriorly to the submedian fold and continued as a line to the submedian or below it. The edge of this black area is straight from the costa to cellule 4, is curved inwards (proximad) over vein 4, and is thence oblique to the margin. Submarginal dots generally 2, sometimes more. Some black basal dusting. Hind wing with narrow grey-black marginal border from the anal angle to vein 4 or a little beyond, sometimes slightly broken up by the white ground-colour.

Underside of fore wing white with blackish-brown marginal border as above. The costa broadly blackish-brown and merged with a broad blackish-brown discocellular bar separated from the apical area by a broad white postcellular bar, which is connected to the posterior white area and does not quite reach the costal edge. Submarginal spots larger than above, the two anterior ones yellow and larger than the other three, and the one in 4 the smaller; sometimes a dot in 2. Hind wing lemon-yellow with a blackish-brown marginal border about 6 mm. broad and of about even width. Five submarginal yellow spots close to the margin, the anterior one larger than the one below it, the four lower spots somewhat lunulate. The distal area between vein 3 and the costa is invaded by white to a variable extent, sometimes reaching to the cell, and this is merged into the yellow colouring.

♀. Upperside creamy-white. Fore wing with brownish basal suffusion and broad black-brown outer marginal border shaped as in the ♂. Costal area beyond the middle black-brown and at the middle only the edge is darkened. A narrow black-brown discocellular bar joined to the costal area. The edge of the marginal area from vein 4 to the inner margin is toothed at the veins. Hind wing with black-brown marginal border 5—6 mm. wide.

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Underside of fore wing as in the ♂. Hind wing as in the ♂, except that the marginal border is broader. Submarginal spots smaller than in the ♂, the anterior spot rounded and larger than the one below it. Veins in the yellow area are for the greater part white.

Genitalia:—

Uncus (pl. i, fig. 12). Type of group 6. Middle lobe much narrower than the outer lobes and a little longer. Tegumen excurved about the middle. Accessory lobe large and rounded.

Valve. As in *enniana contracta*. Slight variation occurs in the length of the distal process.

Habitat.—North-east Dutch New Guinea. In the Hill Museum from the Arfak: Mount Misresi, 3,000 feet, January, 1910; River Uty, January, 1910. Also from Wandammen Bay, November; Kwatizore, Geelvink Bay, February, 1921; Wangaar River, fifteen miles inland from Geelvink Bay, January, 1921; Weyland Mountains: Nomnagihé, twenty-five miles south of Wangaar, 2,000 feet, January—February, 1921. All collected by Messrs. Pratt.

Type ♂ in Mus. Tring, via coll. Levick ex coll. Oberthur. ♀ neallotype (described above) in Hill Museum from Wangaar River.

18c (416). *D. enniana contracta* Talb. (1929).

Delias enniana contracta Talb., *Bull. Hill Mus.*, vol. iii, p. 78 (1929).

Delias enniana Ob., Fruhstorfer 68, p. 128, t. 54a, ♂ ♀.

(Original description).

"♂. Upperside of fore wing with more prominent submarginal spots than in the typical form. Underside of fore wing with narrower white postcellular bar, especially at vein 4. Hind wing with more prominent submarginal spots, and usually with less white distal area and with less evenly curved marginal border.

"♀. Upperside of fore wing chalky-white with broader black discocellular bar and narrower white postcellular bar than in the typical form; edge of marginal border more strongly toothed on the veins. Hind wing creamy-white or chalky-white.

"Underside with more prominent submarginal spots, and less white area on the hind wing than in the typical form.

"This race is chiefly distinguished by the broader discocellular bar on the fore wing; this is almost connected with the black marginal area."

Scent-scale (pl. xix, fig. 14).

Relatively short and narrow, with relatively large disk; base slightly concave.

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Genitalia:—

Valve (pl. ix, fig. 17). Distal edge with a moderately broad finger-like process thickly beset with short bristles. Dorsal edge incurved, excurved posteriorly. Ventral fold with well-defined proximal edge of moderate width. Cavity not seen.

Lamina dentata (pl. vi, fig. 15). Moderately narrow, shorter than in *dice* which it closely resembles. Length = *circ.* 1·1 mm., breadth = *circ.* 0·2 mm.

Habitat.—Waigeu. A series of both sexes, including types, in the Hill Museum, collected in March and May, 1915, by A., C., and F. Pratt.

18D (38). *D. enniana majoripuncta* J. and T. (1922).

Delias enniana majoripuncta Joicey and Talbot, **108**, p. 303 (Mefor) ♂ ♀.

♂. Upperside with white submarginal spots larger than in other races, and the black margin a little less broad than in the type form. Hind wing with marginal spots as in allied forms.

Underside of fore wing with extended white area, especially in cellule 4. Submarginal spots large, especially the one in 6. Hind wing much as in the typical form, but with larger and entirely yellow submarginal spots.

♀. Upperside similar to typical *enniana*, but the black margin of the fore wing not so produced in cellule 4 and narrow in the apical region. Hind wing with black margin as in *enniana*.

Underside of fore wing with black margin slightly broader than in the ♂, and bearing equally large spots. Hind wing with black margin as in the type form, but bearing larger spots.

Habitat.—Mefor Island, August, one ♂, two ♀ ♀.

Types in Hill Museum.

18E (39). *D. enniana kapaura* Roths. (1915) (pl. xxxix, fig. 2).

Delias enniana kapaura Rothschild **180**, p. 178 (Kapaur) ♀.

♂ (?). *Delias dice* Roths. (nec Voll.) **180**, p. 178.

(Original description).

"♀. Below, differs from *en. reducta* in the much rounder wings and the much greater width of the dark distal portions of both wings; on the hind wing the dark area occupies the distal two-fifths of wing.

"*Habitat.*—Kapaur, South-west New Guinea, January—February, 1897 (W. Doherty)."

Three ♀ ♀, including type in Mus. Tring.

The figure on plate xxxix is from the type.

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18F (40). *D. enniana reducta* Roths. (1915) (pl. xxxix, figs. 3, 4).

Delias enniana reducta Rothschild **180**, p. 178 (South and South-east New Guinea).

(Original description).

"♂. Above differs from *en. enniana* in the apical dark portion of fore wing being wider, running round tornus on to inner margin, and having only a single subapical spot. Below the black-brown band from costa across discocellulars on fore wing is much reduced, generally forming a narrow curved line only from subcostal along discocellulars, not reaching lower angle of cell; on hind wing the marginal band is narrower and its inner edge is regularly rounded instead of sinuate; the submarginal band of spots is still more reduced, the upper spot only being present and the second to fourth barely indicated by whitish hair-like streaks.

"♀. Below, all dark portions reduced and much narrower, and submarginal spots on hind wing much smaller."

Habitat.—South Dutch New Guinea and North and South-west British New Guinea. Types ♂ ♀ from Eilanden River, December, 1910, A. S. Meek, in Mus. Tring. Also in Mus. Tring from Lower Oetakwa River, Snow Mountains, November. In Hill Mus. from Upper Oetakwa River, 2,000—3,000 feet, July—September, 1910. In Mus. Tring from Kebea, 3,600 feet, May—July (South-west British New Guinea); Biagi, 5,000 feet, February (North British New Guinea).

Our figures are from the type specimens.

18G (47). *D. enniana ecceicei* J. and T. (1916) (pl. xl, fig. 1).

Delias dice ecceicei Joicey and Talbot **107**, p. 64, pl. iv, fig. 2 (Ekeikei) (part.).

♂. Upperside as in *enniana* Ob. except that the black border of the hind wing is narrower. Underside of fore wing with broader white postcellular bar and narrower brown discocellular bar than in *enniana*. Hind wing with narrower marginal border and smaller submarginal spots, the anterior one being yellow and larger than the others which are white; marginal border edged with white proximally from vein 4 to the costa. The dark marginal areas are fuscous-brown.

♀ (?). Similar to *reducta* ♀, but the fore wing has the edge of the white area less indented in cellule 3, and the hind wing has a narrower black margin. On the hind wing below the submarginal spots are vestigial except the rounded anterior spot.

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Habitat.—South-west and South-east British New Guinea. Type ♂ in Hill Museum from Ekeikei, 1,500 feet, January—February, 1903, A. E. Pratt. The ♀ described above probably belongs here and is in the Tring Museum from Sariba Island, South-east New Guinea.

This form was described as belonging to *dice*. We were forced to examine the uncus of the type specimen, and found it belonged to the *enniana* type. The other specimen was found to belong to *dice* and has been transferred to the *samarai* race.

19. **D. DICE** Voll.

The differences between this species and *enniana* have been mentioned under that species. Some confusion has resulted in identifying the females of *dice*, and they have been mixed with *enniana* and with *ennia* Wall. The ♀ of *ennia* has never any black discocellular bar on the fore wing, and the submarginal spots of the hind wing are orange.

The ♂ of *dice* is distinguished by the straighter edge of the black margin of the fore wing. On the hind wing below the submarginal spots are small, and often obsolete, and the anterior one is but slightly larger than the one below it. The ♀ has on the fore wing above an isolated white postcellular bar, and on the underside this bar is either very narrowly connected to the white area, or is again free. The submarginal spots of hind wing are as in the ♂.

Length of fore wing, ♂ 30—35 mm., ♀ 29—35 mm.

Distribution.—Waigeu, Dutch and British New Guinea, and Rossell Island. Seven races are known.

19A (41). *D. dice mitisana* Stnd. (1916).

Delias mitisana Strand (nom. nov.) **217**, p. 13 (♀ Waigeu, ♂ Dutch New Guinea).

Delias dorothea Mitis (♀ nec ♂) **137**, p. 146, t. iii, fig. 4 (Waigeu).

Delias dorothea H. G. Smith (nec Mitis) **193**, p. 335 (Humboldt Bay, ♀).

Delias dice dorothea Mitis, Fruhstorfer **57**, p. 307 (Waigeu); **68**, p. 128, t. 55e (Waigeu) ♂ ♀.

♀. *Delias ennia* Wallace **228**, p. 355, pl. vii, fig. 4 ♀ (Waigeu).

The " ♂ " type of Mitis' *dorothea* is the true ♀ of *ennia* Wallace, and the ♀ figured by Wallace as of his *ennia* is the true ♀ of *mitisana* (*dorothea*).

♂. Upperside white. Fore wing with black marginal border as in

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enniana, its edge but slightly produced at vein 4. Two indistinct subapical dots, sometimes absent. Hind wing with narrow black marginal border from the anal angle to vein 6.

Underside of fore wing much as in *enniana*, the postcellular white bar variable in width. Submarginal spots small, the two anterior ones yellow, the others indistinct and often obsolete. Base of cell strongly washed with yellow. Hind wing darker yellow than in *enniana*, distally between vein 4 and the costa some slight white suffusion never extended as in *enniana*. Grey-black narrow marginal border without submarginal spots or only with indications of such spots.

♀. Upperside resembles *enniana*, but the postcellular white bar narrower, isolated and extending only to vein 5, the white proximal area reaching vein 4. Two yellowish subapical spots, usually indistinct. Hind wing tinged with yellow. A black marginal border about 4 mm. wide.

Underside of fore wing similar to upperside, the submarginal spots more distinct. Hind wing yellow as in the ♂, and with wider grey-black border of variable width, sometimes reaching 8 mm.; this border is edged with white suffusion proximally, and the veins are striped with white in the yellow area. Submarginal yellow spots prominent, the anterior one rounded and not larger than some of the others.

Scent-scale (pl. xix, fig. 15).

Long and narrow. Disk of moderate size.

Genitalia:—

Valve (pl. ix, fig. 18). Distal edge with a moderately broad finger-like process thickly beset with short bristles. Dorsal edge nearly straight, slightly excurved posteriorly. Ventral fold broad with weakly-defined proximal edge. Cavity of moderate size.

Uncus (pl. i, fig. 16). Type of Group 6. Outer lobes very broad, the middle lobe shorter, accessory lobes long and narrow, forming an oblique shoulder. Tegumen excurved at the middle.

Lamina dentata (pl. vi, fig. 3). Long and narrow, distal ends oblique. The middle of anterior margin slightly convex. Posterior margin excurved at the middle. Teeth strongly developed and numerous, reaching the distal margins. Length = *circ.* 1·4 mm., breadth = *circ.* 0·2 mm.

Habitat.—Waigeu and North-east Dutch New Guinea. In the Hill Museum a series of both sexes from Waigeu collected February—May,

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by Messrs. A., C., and F. Pratt, and one ♂ collected by them on Roon Island. Also ♂ allotype of Strand from Dutch New Guinea. The type of the ♀ figured by Mitis is in the Mus. Berlin.

In Mus. Tring also from the east side of Geelvink Bay, three ♂ ♂, one ♀.

19B (404). *D. dice mitisana* f. *pictula* Stnd. (1916).

Delias mitisana ab. *pictula* Strand 217, p. 13, t. xvi, fig. 20 (Dutch New Guinea).

Only differs in the fore wing bearing a row of five submarginal spots on both sides, more strongly marked and somewhat rounded on the underside. Described from a single ♂ from Dutch New Guinea, now in the Hill Museum.

19C (42). *D. dice mitisana* ♀ f. *latoclavata* Van Eecke (1924) (pl. liv, fig. 6).

Delias dice latoclavata Van Eecke 34, p. 34 (North-east Dutch New Guinea).

This name applies to very dark females which resemble some specimens of *latimarginata*.

Upperside with broader black distal and costal area which extends into the end of the cell and fills more than half of cellule 3. The white postcellular bar is reduced to a mere subcostal streak. Hind wing yellowish, with the marginal border extended almost to the cell.

Underside of fore wing as above but with six submarginal spots of which the three anterior ones are yellow. Hind wing marginal border reaching the end of the cell.

Habitat.—Pionierbivak, near Mamberano River, North-east Dutch New Guinea, one ♀ in Mus. Leyden.

We reproduce an excellent coloured figure kindly made by Dr. Van Eecke.

19D (43). *D. dice mitisana* ♀ f. *leucana* Stnd. (1916).

Delias mitisana ♀ f. *leucana* Strand 217, p. 14.

This name is applied to specimens which have a white instead of yellow colour on the upperside of the hind wing. On the hind wing below the yellow colour is largely replaced by white.

In the Hill Museum are three specimens from Waigeu, February—May.

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19E (44). *D. dice dice* Voll. (1865) (pl. liv, figs. 4,5).

Pieris dice Vollenhoven **226**, p. 39, ♂ ♀, t. 4, fig. 7 ♀ (New Guinea).
Thyca dice Voll., Wallace **228**, p. 355.
Delias dice Voll., Mitis **137**, p. 109.
,, ,, Voll., Butler **14**, p. 157.
,, ,, Voll., Fruhstorfer **57**, pp. 307—308; **68**, p. 128.
,, ,, Voll., Rothschild **180**, p. 178 (err. ident.).
,, ,, Voll., Joicey and Talbot **111**, p. 634.

♂. Upperside resembles *mitisana*. Fore wing with diffuse inner edge of the black marginal border and two small white subapical spots. Hind wing with the narrow black border becoming more narrow from vein 4 to the costa.

Underside resembles *mitisana*, fore wing with more distinct submarginal spots. Hind wing with five distinct yellow submarginal spots.

♀. Upperside with broader black marginal borders than in *mitisana* and more resembling *latimarginata*. Fore wing chalky-white. White subcostal streak short but more developed than in *latoclarata*. Black distal area broader than in *latoclarata*, especially at the tornus. Hind wing creamy-white with the marginal border a little wider than in *mitisana*.

Underside of fore wing as above and somewhat like *latimarginata*. The anterior three submarginal spots are orange and much more strongly marked than the others. The cell is washed with yellow for the greater part. Hind wing marginal border not quite reaching the end of the cell, its edge straight and sharply-defined. Proximal area deep yellow, the veins white, and some white suffusion in the bases of cellules 5 and 6. The six submarginal spots are orange.

Habitat.—Dutch New Guinea, possibly in the South-western District. We have been unable to match the type specimens with any others, and material of *dice* from various parts of Dutch New Guinea is an important desideratum. Although common on Waigeu, the species appears to be rare on the New Guinea mainland.

Types ♂ ♀ in Mus. Leyden. Our figures of the types are reproduced from excellent drawings kindly made by Dr. Van Eecke.

19F (45). *D. dice latimarginata* J. and T. (1925) (pl. xxxix, figs. 5-8).

Delias dice latimarginata, Joicey and Talbot **111**, p. 633 (Weyland Mountains).

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(Original description).

" ♂. Upperside of fore wing with a slightly broader black margin than in the other forms.

" Underside of hind wing with the brown margin mostly broader than in *mitisana* Stnd., and four out of seven specimens being half again as broad.

" ♀. In two forms. One with broad black margin which we regard as typical. The costal spot on the fore wing above reduced. On the hind wing with black margin extending nearly to the cell, with a proximal shaded area from the inner margin to vein 5 between cell and edge of the black margin; basal area pale yellow. Underside of hind wing with the brownish-black margin extended to end of cell, and with blackish dusting on inner margin.

" The other female, of which there is only one specimen (fig. 8), is very close to *mitisana* ♀, but the black margin of hind wing is broader. On the underside of fore wing the basal yellow is extended to end of cell.

" *Habitat.*—S. Geelvink Bay: Wangaar River, ca. 15 miles inland, 600 feet, January, 1921, two ♂ ♂; Nomnagihé, 25 miles south of Wanggar, 2,000 feet, January—February, four ♂ ♂, two ♀ ♀ in the Hill Museum and one ♀ in Tring Museum, also one ♀ of the second form." Also two ♀ ♀ from Humboldt Bay, September—October (Doherty), in Mus. Tring.

Type ♂ from Wangaar River, allotype from Nomnagihé, in Hill Mus.

19G (46). *D. dice fulvoflava* Roths. (1915) (pl. xxxix, fig. 9).

Delias dice fulvoflava Rothschild 181, p. 6 (Snow Mountains).

? *Delias dice* subsp. Fruhstorfer 68, p. 128, t. 54a (Kajumera Bay).

(Original description).

" ♂. Upperside white, costa and apical one-fifth obliquely including termen of fore wing black, 2 somewhat obsolete white subapical spots; margin of hind wing from vein 6 gradually widening to tornus black.

" Underside white, costa and apical area of fore wing as above, black with a band of subapical lemon-yellow spots, base of wing lemon-yellow; basal one-fifth of hind wing lemon-yellow, a row of fulvous orange spots in black margin.

" ♀. Cream-white; fore wing, base grey, costal area and outer one-third obliquely sooty brown-black, a white postcellular patch and 2 indistinct subapical spots; hind wing stained with fulvous yellow and with sooty brown-black broad margin.

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" Underside white with brown-black areas of fore wing as above; basal half of cell and 2 subapical spots fulvous yellow, 3 indistinct subterminal white spots; outer one-third of hind wing brown-black with submarginal row of fulvous yellow spots, basal one-sixth of wing and numerous splashes fulvous yellow. The second ♀ has the fulvous yellow replaced by fulvous orange."

Habitat.—Snow Mountains, Dutch New Guinea; Utakwa River, Base Camp, November 1912 and January, 1913 (♀), Utakwa River, 3,000 feet, January, 1913 (♂). Types in Mus. Tring.

A ♀ in the Munich Museum from Kajumera Bay on the Onin Peninsula, is probably the specimen figured by Fruhstorfer. It is very near *fulvoflava*. We have seen no ♂ from this district.

Our figure is from a specimen in the Hill Museum.

19H (48). *D. dice samarai* J. and T. (1916) (pl. xl, figs. 2, 3).

Delias dice samarai Joicey and Talbot 107, p. 64, pl. vi, figs. 4 ♂, 5 ♀ (British New Guinea).

D. dice ecceicei J. and T. 107, p. 64, pl. iv, fig. 3 ♀ (hab.) (part.).

♂. Upperside as in *mitisana* except that the black border of hind wing is a little broader, and on the fore wing at least two of the submarginal spots below are reproduced. Fore wing in two paratypes with more developed subapical spots.

Underside of fore wing as in *mitisana* except that the submarginal spots are more prominent, the anterior one larger than in *mitisana*. Hind wing as in *mitisana* but the anterior submarginal spot somewhat rounded and more prominent.

♀. Resembles *mitisana*. Upperside of fore wing with reduced costal white bar; marginal brown broader between vein 3 and inner margin; basal dark suffusion reaching origin of vein 2. Hind wing with much broader marginal brown than in *mitisana*; basal dark suffusion extended to origin of veins 7 and 2.

Underside of fore wing with costal bar joined to the apical brown; third apical spot tinged with yellow. Hind wing with the nearly straight edge of distal margin reaching origin of vein 4.

Habitat.—South-east British New Guinea. In the Hill Museum from Samarai (Types) three ♂♂ one ♀, also one ♂ from Ekeikei, South-west British New Guinea, one ♀ (hab.?). In Mus. Tring, from Sariba Island, two ♂♂, also from Milne Bay.

Some slight individual variation exists in these specimens, but the

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type and another are proved to be *dice* by dissection. Although on the hind wing below the anterior submarginal spot is rounded and is larger than the others, the further character that the edge of the border is at almost right angles to the costa and not oblique to it, indicates *dice*. In the absence of further material, we feel obliged to include the Ekeikei ♂ with this race.

191 (49). *D. dice rectifascia* Talb. (1928).

Delias dice rectifascia Talbot **222**, p. 42 (Rossell I.) ♂ ♀.

(Original description).

" Compared with *dice samarai* J. and T.

" ♂. Fore wing below with the white costal bar rectilinear, being broader and not constricted in cellule 4; costal black bar not filling the whole of the base of cellule 4. Hind wing below with the margin a little narrower.

" ♀. Hardly distinguishable from *samarai* ♀ (Milne Bay, etc.), fore wing below with white costal bar larger. Hind wing below with reduced yellow markings and the white ground more prominent. A ♀ from Sud Est only differs from *samarai* ♀ in the reduced yellow markings on hind wing below.

" *Habitat.*—Rossell Island (A. S. Meek) three ♂♂, one ♀ (types); Sud Est Island: Mount Riu, 2,000 feet, April (Eichhorn Bros.), one ♀. All in coll. Rothschild."

Note.—We are not satisfied with the classification of the various forms of *dice*, and the true status of these forms will not be elucidated until considerable material of both *dice* and *enniana* is collected for study.

GROUP III.

Species of moderate size with somewhat rounded wings. The hind wing below is black with or without submarginal spots.

Scent-scale with comparatively small disc, moderately long and broad except in *totila*, which is longer and narrower than the others.

Uncus of Group 1 in *chrysomelaena*, or Group 2 in the others. A very characteristic type (see pl. i, figs. 14—19).

Valve somewhat as in the *nysa* group, but only in *chrysomelaena* with a distinct process, the other species with a broad rounded apical protuberance.

Contains six species. The species range from the Northern Moluccas to New Guinea, the Schouten Islands, and the Bismarck Islands.

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KEY TO SPECIES.

1. Fore wing below black with yellow or yellowish-white basal area 2
   Fore wing below white with black apical area 3
   Fore wing below black with bluish-white proximal half ... *totila*
2. Hind wing below with yellow median patch ... ... *chrysomelaena*
   Hind wing below black with large white submarginal spots ... *talboti*
   Hind wing below without submarginal spots (♂), or with small yellow submarginal spots (♀) ... ... *caliban*
3. Hind wing below with costa yellow at the base ... ... *ladas*

20. **D. CHRYSOMELAENA** Voll.

This is a large species with the fore wing less rounded than in others of this group. The ♂ is white or yellow above, and the ♀ is black. Both wings are black on the underside, with a distinct white discocellular dot. The hind wing below in the ♂ bears a large yellow median patch; in the ♀ this patch is indistinct and is merged with the yellow basal dusting. Two races are known.

20 (50). *D. chrysomelaena chrysomelaena* Voll. (1866).

Pieris chrysomelaena Vollenhoven **227**, p. 57, pl. i, figs. 1, 2, ♂ (Batjan).

Thyca chrysomelaena Voll., Wallace **228**, p. 359.

Delias chrysomelaena Voll., Staud. **208**, p. 35, t. 19, ♂ ♀.
Voll., Ribbe **162**, p. 204 (Batjan).
Voll., Mitis **137**, p. 111.
Voll., Butl. **14**, p. 155.
Voll., Fruhst. **68**, p. 130, t. 55b.

♂. Upperside creamy-white. Fore wing with narrow black (somewhat white-dusted) apical area, which extends as a narrow marginal border from vein 4 to vein 2. Three white subapical spots in cellules 5, 6, 8, the lower one being within the black border. Two white spots close to the margin in 3 and 4. Some grey-black dusting at the base. Hind wing with a shadowy grey-black marginal border from the anal angle to vein 5. Some grey-black basal dusting.

Underside fuscous-black. Fore wing with proximal half of cell tinged with yellow, the submedian area grey-white. A white discocellular spot. Three subapical spots as above, yellow or white, the two lower ones with distal prolongations. Four small white submarginal spots in 1b, 2—4, each touching the margin by a distal prolongation.

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Hind wing with yellow costal margin. A large yellow median patch, broad on the inner margin and becoming narrower to vein 4, not entering the cell. Proximal area dusted with yellow. Six submarginal spots, the two anterior ones yellow, the others white, of triangular form with their apices touching the margin.

Fringe of both wings white.

♀. Upperside black with creamy-white submarginal spots, and grey proximal dusting. Fore wing with six spots placed as in the ♂ but with their apices not usually touching the margin; two marginal dots in 1b and 1c. Hind wing with six spots formed as in the ♂. The inner margin greyish-white.

Underside fuscous-black. Fore wing marked as in the ♂, but the submarginal spots are farther from the margin and larger than on the upperside. Hind wing with a yellow median patch which is narrower and less distinct than in the ♂ and is merged with the basal yellow dusting. The submarginal spots are much larger and more sharply defined than above; the four posterior ones are deeply toothed on the proximal edge, and are usually tinged with yellow.

Fringe of both wings white between the veins, and fuscous at the veins.

Length of fore wing, ♂ 35—40 mm., ♀ 32—37 mm.

Scent-scale (pl. xix, fig. 16). Moderately long and broad, similar to some forms of the *nysa* group.

Genitalia:—

Valve (pl. ix, fig. 19). Apex produced to a narrow tapering process. Dorsal edge nearly straight, only very slightly curved. Anterior sclerotic area broad.

Uncus (pl. i, fig. 13). Belongs to the type of Group 7. A narrow type with short, broad and well separated lobes.

Habitat.—Northern Moluccas: Batjan. Type in Mus. Leiden from Kaioa Island, north of Batjan.

20 (51). *D. chrysomelaena prodigialis* Fruh. (1911).

Fruhstorfer **69**, pp. 185-186 (Halmaheira) ♂ ♀.

This race is distinguished by the yellow colouring of the upperside. The fore wing above is without the dark apical border. The yellow median patch on the hind wing below is smaller.

The type ♂ (taken by Dr. Platen, 1894) is in the Berlin Museum. We have not seen another specimen, but the ♀ was apparently seen by Fruhstorfer.

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21 (52). **D. TALBOTI** J. and N. (1916) (pl. xl, figs. 4, 5).

Joicey and Noakes **106**, p. 182, pl. xxii, figs. 1 ♂, 2 ♀ (1916) (Biak).

This distinct species appears to be restricted to the Schouten Islands, north New Guinea, and is only known from the island of Biak where it was discovered by the collectors Pratt.

♂. Upperside white. Fore wing with narrow black apical and marginal border ending in a point at vein 2. Underside black. Fore wing with basal half to near end of cell, base of 3, part of 2, most of lower median area, and inner margin white. Basal two-thirds of cell tinged with yellow. Four apical white spots and a faint spot in 3 near margin. Hind wing with cellule 8 yellow to the base. A submarginal row of square-shaped grey-white spots in cellule 1c—6, placed near the margin. Inner margin faintly scaled with grey-white anteriorly, and with dark yellow at the base.

♀. Wings rounded. Upperside black; basal area greyish-white with some yellow scaling, rendered dark by the underlying ground-colour. Fore wing with a submarginal row of 6 white spots which are larger towards the apex. Hind wing with a similar row of smaller spots of nearly equal size. Inner margin grey-white; proximal area dusted with yellow.

Underside black. Fore wing with the greater part of cell to below median yellow. Submarginal spots as above but larger and better defined. A distinct spot touching margin, on the submedian fold. Hind wing as in the ♂ but with stronger yellow basal dusting. Abdomen yellow below.

Length of fore wing, ♂ 34—36 mm., ♀ 31—34 mm.

The insect was taken on Biak in May and June, and was only found at one place on the island. It formed 26 per cent. of the total number of Delias taken on Biak. The proportion of the sexes of *talboti* was ♂ 63 per cent., ♀ 37 per cent.

Scent-Scale (pl. xix, fig. 17). Very similar to *chrysomelaena* but shorter, the base not incurved.

Genitalia :—

Valve (pl. ix, fig. 20). Apex produced to a short broad and rounded process. Dorsal edge nearly straight, excurved posteriorly. Cavity small.

Uncus (pl. i, fig. 14). Type of Group 2. Middle lobe very short. Outer lobes curved inward and almost touching one another above the middle lobe. Tegumen gently incurved.

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Lamina dentata (pl. vi, fig. 7). Long and narrow, distal ends rounded. The unarmed part of the anterior margin is nearly half the length of the lamina and is incurved. The unarmed part of the posterior margin is shorter and projects sharply at the centre. Teeth strongly developed, and a large distal area is bare. Length=*circ.* 1·4 mm., breadth=*circ.* 0·19 mm.

We have figured the type specimens which are in the Hill Museum.

22. D. LADAS Sm.

An inconspicuous species of moderate size, distinguishable by its white upperside with broad black apical area on the fore wing, and by its black under-surface of the hind wing marked with a small yellow apical spot. Three races are known, inhabiting Waigeu and New Guinea.

22 (53). *D. ladas waigeuensis* J. and T. (1917) (pl. xl, fig. 7).

Joicey and Talbot, *Ann.* and *Mag. of Nat. Hist* (8), 20, p. 217 (1917) (Waigeu).

(Original description).

" ♂, ♀. Differs from typical form in the reduced apical black on the fore wing; this is more apparent below, where the black margin does not continue below vein 2, except very slightly in the ♀, and the white spot in 4 is much larger.

" *Habitat.*—Waigeu, February—May, seven ♂ ♂, five ♀ ♀."

We have figured the type.

22 (54). *D. ladas levis* J. and T. (1922).

Joicey and Talbot 108, p. 306 (1922) (Dutch New Guinea) ♂, ♀.

Huphina ladas Smith; Rothschild 181, p. 10 (Snow Mountains).

(Original description).

" ♂, ♀. Upperside of fore wing with more extended white area, principally in cellules 3—5, not to such an extent as in the race from Waigeu.

" Underside of fore wing with the cell white, also base of cellule 4 and with more or less white scaling in 5."

Scent-scale (pl. xix, fig. 18). About the size and shape of *talboti* scale, but a little longer and with slightly larger disc.

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Genitalia :—

Uncus (pl. 1, fig. 15). Type of group 2. Middle lobe very small. Outer lobes erect and very broad. Tegumen nearly straight, slightly incurved at the middle. A narrow type.

Lamina dentata (pl. vi, fig. 13). Short and broad, distal ends rounded. The middle of the anterior and posterior margins is strongly incurved. Teeth strongly developed and numerous. Length = *circ* 1·1 mm., breadth = *circ* 0·19 mm.

Habitat.—Menoo River, 3,500—5,000 feet, November—January (types); Mount Kunupi, 6,000 feet, November—January; Nomnagihe, 2,000 feet, January—February; Angi Lakes, Arfak Mountains, 6,000 feet, January—February; Wandammen Mountains, 3,000—4,000 feet, November. A series from these localities. Also from Mount Misresi, Arfak Mountains, 3,000 feet, January, one ♂; Coast district, Geelvink Bay, November, one ♂; Momi, Arfak Mountains, 4,000 feet, November—December, one ♂, one ♀; Oetakwa River, Snow Mountains, to 3,500 feet, November—December, one ♂.

The majority of these specimens belong to this form, but a few examples of typical *ladas* occur.

22 (55). *D. ladas ladas* Sm. (1897) (pl. xl, fig. 6).

Delias ladas Grose Smith **193**, p. 585 (Saddleberg, "German New Guinea") ♂ ♀.

,, ,, Smith and Kirby **200**, Del. v, figs. 4, 5 ♂, 6 ♀, p. 17.

Huphina ladas Sm., Fruhstorfer **68**, p. 147, pl. 63 b.

,, ,, Butler, *Ann. Nat. Hist.* (7) 3, p. 206 (1899).

Delias ladas Sm., Dixey, *Trans. Ent. Soc. Lond.*, 1918, p. 123.

♂. The black distal area of the fore wing is broader throughout than in other forms. The black border of the hind wing above is also heavier than in other forms. On the fore wing below the yellow subapical spot in 6 is larger.

♀. The black distal area of the fore wing and the black border of the hind wing are broader than in other forms.

Genitalia :—

Valve (pl. ix, fig. 21). Distal edge produced to a broad short and round process. Dorsal edge nearly straight, excurved posteriorly. Cavity not seen.

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Uncus (pl. i, fig. 17). Type of Group 2. Middle lobe very small. Outer lobes very broad and slightly curved inward. Tegumen incurved.

Larva and *pupa* (pl. lxvii, figs. 6, 6a).

Our illustrations are from drawings in the possession of the Tring Museum. The *larva* is pale green with apparently two rows of greenish-white hairs. The *pupa* is darker green. The head process is strongly bifurcate. There is a dorsal row of short dark filaments and a row of three similar filaments on the wing cases. The characters of this pupa are similar to those of *duris* (pl. liii, fig. 10).

Habitat.—The British Territories of New Guinea. Type described from the Saddleberg, in former German territory (N.E. Brit. New Guinea), from specimens collected by Webster in 1894.

In the Hill Museum from N.E. British New Guinea: Saddleberg (types); Berg. Gehr. North British New Guinea: Biagi; Hydrographer Mountains, 2,500 feet, January—May. South-west British New Guinea: Owgarra; Aroa River, March; Kebea, 3,000 feet, May—July; Yule Island.

Also in the Tring Mus. from the Saddleberg, January; Biagi, 5,600 feet, January—April; Rawlinson Mountains; Milne Bay, December; Angabunga River, 6,000 feet, November—February.

The types are in the Hill Museum.

We figure the holotype.

Habits.—According to Fruhstorfer 68 l.c., this insect "inhabits elevated localities and it is the only Pierid which occurs in the midst of the gloomy primeval forest on Mt. Gelu in German New Guinea at about 1,500 m. even during the height of the rainy season and settles on the sandy banks of the watercourses."

Delias ladas was associated by Butler (*Ann.* and *Mag. Nat. Hist.* (7) 3, p. 206, 1899) with species of the genus *Huphina*. This was copied by Fruhstorfer 68. The error was made clear by Dixey, l.c., in his paper on Delias mimicry, and has since been explained by other authors.

24. **D. CALIBAN** Sm.

A species as large as *talboti* but very like *ladas* in appearance. Only two forms are known. The species is confined to the Islands of Goodenough and Fergusson, but may be expected to turn up on the mainland of New Guinea.

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24 (57). *D. caliban caliban* Sm. (1897).

Delias caliban Grose Smith **196**, p. 404 (Fergusson Island), ♂.

„ „ Smith and Kirby, **202**, p. 26, figs. 6, 7, ♂.

♂. Upperside white. Fore wing with black distal area not quite reaching the cell, and shaped as in *ladas ladas*. Hind wing with black marginal border at least twice as wide as in *ladas*.

Underside of fore wing with black-brown distal area extended into the cell, along the costal margin to the base, and almost to the base of cellule 3. Two small yellow subapical spots in 6 and 7. Hind wing brown-black. Basal third to middle of cell dusted with greenish-yellow, more strongly so on the costa. A small yellow submarginal spot in 6.

Length of fore wing, 35 mm.

Scent-scale (pl. xix, fig. 19).

Resembles the scale of *ladas* but is shorter and slightly flattened at the sides.

Habitat.—Fergusson Island, taken between September and December.

Type ♂ in the Tring Museum.

24 (58). *D. caliban satisbona* Roths. (1915) (pl. xl, fig. 8).

Rothschild **180**, p. 175 (Goodenough Island) ♂ ♀.

(Original description).

" ♂. Differs from *c. caliban* below in the reduction in fore wing of the white basal area below vein 3, and in the strong reduction of the basal yellow area in the hind wing.

" ♀. (The ♀ of *c. caliban* is unknown). Above, head and thorax grey suffused with yellow; abdomen sulphur-yellow. Fore wing, basal $\frac{1}{3}$ obliquely white suffused with sulphur-yellow; outer $\frac{1}{3}$ black; two small subapical spots. Hind wing, basal half sulphur-yellow, outer half black. Below, fore wing as above, but with four large golden-yellow subapical spots; hind wing black, base and abdominal area powdered with sulphur-yellow; a submarginal band of golden-yellow spots."

Genitalia :—

Valve (pl. ix, fig. 22). Distal edge produced to a broad short and rounded process. Dorsal edge nearly straight, excurved posteriorly. Ventral fold broad with sclerotized proximal area. Cavity small.

Uncus (pl. i, fig. 18). Type of Group 2. Middle lobe short and narrow. Outer lobes very broad and slightly curved inward.

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Habitat.—Goodenough Island, 2,500–4,000 feet, May. Taken by A. S. Meek.

Types in the Tring Mus. Both sexes represented in the Hill Mus.

25 (59). **D. TOTILA** Heller (1896) (pl. xl, figs. 9, 10).

Heller **88**, p. 177 (New Britain) ♂.

Ribbe **165**, p. 162, ♀ ; **164**, p. 88, pl. iii, figs. 1, 2, ♂ ♀.

Pagenstecher **159**, p. 35.

Rothschild **180**, p. 175, ♀.

Fruhstorfer **68**, p. 127.

A conspicuous species with bright yellow basal area (in the ♀ bluish-grey) and black distal area.

♂. Upperside black with yellow basal area which on the fore wing extends to vein 2 and on the hind wing to the end of the cell. Fore wing with a more or less distinct white subapical stripe in cellule 6, and sometimes a streak below it.

Both wings with the black area covered with modified scales, leaving a narrow costal and outer border free.

Underside black. Fore wing with bluish-white (more white basally) proximal area reaching end of cell and to just before the tornus, its edge sharply defined. Hind wing with basal area greenish-yellow, lightly bordered with bluish-white which extends along the inner margin to the end of the submedian.

♀. The proximal area of both wings more extended than in the ♂. Fore wing black with bluish-grey proximal area. Hind wing black with greenish-yellow proximal area which is sometimes bordered with bluish-grey. Underside as in the ♂.

Length of fore wing, ♂ ♀ 30 mm.

Scent-Scale (pl. xix, fig. 20).

Much longer and narrower than in other species of this group, and with a single central thickening. The disc is large relatively to the width of the base.

The scales on the hind wing are of the same form as those on the fore wing.

Genitalia :—

Valve (pl. ix, fig. 23). Distal edge produced to a rather broad, short and rounded process. Dorsal edge incurved at the middle. Cavity small. Ventral fold broad posteriorly, with sclerotized proximal edge.

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Uncus (pl. i, fig. 19). Type of Group 2. Middle lobe short and narrow. Outer lobes moderately broad and curved inward. A narrow type.

Lamina dentata (pl. vii, fig. 61). Long and narrow, distal ends rounded. The middle of the anterior and posterior margin is long and slightly concave. Teeth strongly developed. Length = *circ.* 1·27 mm., breadth = *circ.* 0·33 mm.

Habitat.—New Britain and New Ireland. Taken in November, December, January and February.

Mimicry.—The ♂ of this species resembles the yellow ♀ of the Nymphaline *Mynes katharina* Ribbe. The ♀ above resembles the typical ♀ of this *Mynes* (see page 66).

We do not know where the type is.

Our figures are made from New Ireland specimens.

Unrecognized species.

Huphina viridomara Fruhst.

Fruhstorfer 69, p. 186 (German New Guinea).

As this insect was described as being near *ladas* Sm. we inserted it provisionally in our list of species (p. 25). Dr. Hering, of the Berlin Museum, has kindly searched for this insect. He can only find specimens of *Huphina abnormis* Wall. which agree partly with Fruhstorfer's very abbreviated and not intelligible description. Possibly the insect is one of these.

GROUP 4.

Species of moderate size. The hind wing below is fuscous-brown with a purplish tinge; it has the costa red at the base in *lecerfi*, yellow in the others; submarginal yellow spots present except in *lecerfi*.

Scent-scale with relatively large disc, long and narrow with thickened edges.

Uncus in *lecerfi* of Group 9 (pl. i, fig. 22), in the others of Group 1c (pl. i, figs. 20, 21).

Valve with the apex somewhat truncate and incurved (*lecerfi*), or with a short protuberance directed outwards. Dorsal edge with a conspicuous bulge posteriorly.

The group contains three species, of which no local races are so far known. The species *lecerfi* is not very closely related to the other species in the group, but may form a link with the next group.

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Key to the Species.

1.	Hind wing below with costa red at the base	*lecerfi*
	Hind wing below with costa yellow at the base	2
2.	Fore wing below with a yellow discal band...	*schmassmanni*
	Fore wing below without a discal band	*stresemanni*

26 (60). **D. SCHMASSMANNI** J. and T. (1923).

Delias schmassmanni Joicey and Talbot **109**, p. 26 (Buru) ♂ ♀; **110**, p. 509, pl. vi, figs. 5, 6.

(Original description).

"♂. Upperside white with the fringes black at the veins. Fore wing with the apical margin narrowly black. Underside of fore wing with the apical area benzo-brown (Ridgway, pl. xlvi), ground-colour black. A postdiscal band of pale yellow, of variable width, much broader posteriorly and joined to the white inner margin. A small yellow costal spot in cellule 8. Hind wing benzo-brown. A yellow postdiscal band deeper in colour than on the fore wing and variable in width, broadening posteriorly to join the brighter yellow inner margin. Six yellow and rounded marginal spots, those in 2 and 3 much larger than the others. Costal edge narrowly yellow from base to postdiscal band.

"♀. Upperside white, with broad black margins. Fore wing with black apical area narrowing below vein 3, and bearing four white apical spots. Costa narrowly black, and discocellular black. Hind wing with the black outer margin narrowing posteriorly and bearing five indistinct marginal yellow spots.

"Underside as in the ♂, but fore wing with the apical spots reproduced and some yellow dusting over the cell.

"One specimen has a narrower black margin on the hind wing, not reaching below vein 4.

"Length of fore wing: ♂ ♀ 37—39 mm."

Scent-scale (pl. xx, fig. 21). Long and narrow with thickened edges, the base deeply incurved, length six times the width at the base.

Genitalia:—

Valve (pl. ix, fig. 24). Distal edge with a short and somewhat triangular process directed distad. Dorsal edge nearly straight, and sharply incurved posteriorly. Ventral fold narrow. Cavity not seen.

Uncus (pl. i, fig. 20). Type of Group 1c. Lobes narrow, middle one shorter. Tegumen rather broad and inflexed. A broad type.

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Lamina dentata (pl. vii, fig. 58). Short and moderately narrow, distal ends rounded. The middle of the anterior margin incurved, and of the posterior margin excurved. Teeth well developed on the anterior margin, absent on the posterior margin.

Length = *circ.* 1 mm., breadth = *circ.* 0·2 mm.

Habitat.—West Central Buru: Gamoe 'Mrapat, 5,000 feet, April, 1922. Discovered by the brothers Pratt.

Types in the Hill Museum.

Some variations occur in the width of the discal band on both wings; on the hind wing in one ♂ it is a mere line.

This distinct species appears allied to *stresemanni* Roths.

27 (61). **D. STRESEMANNI** Roths. (1915) (pl. xli, figs. 1, 2).

Delias stresemanni Rothschild, *Nov. Zool.*, xxii, p. 110 (1915) (Ceram) ♂ ♀.

,, ,, Roths., Talbot, **221**, p. 404 (Ceram) ♂ ♀.

In this species the apex of the fore wing is somewhat pointed. The hind wing below has a small but conspicuous discal spot which is white in the ♂ and sometimes yellow in the ♀. The ♀ is grey (sometimes buff-yellow) with broad black marginal areas, and with white, grey or yellowish submarginal spots on the fore wing. This sex is variable and five forms are indicated.

(Original description).

"♂. Above.—Fore wing cream white, apex broadly black running down in diminishing width along termen to vein 2, costa black. Hind wing cream-white narrowly edged with black. Below.—Fore wing black-brown with strong metallic bronzy glaze, a white dot at the end of cell, three yellow spots in apex and three whitish small spots along termen. Hind wing black-brown strongly glazed with metallic bronze, and orange costal band and a terminal line of orange streaks, a white spot at apex of cell and a broad cloud-like whitish postmedian band.

"♀. Above.—Fore wing, basal three-fifths obliquely pale grey, outer two-fifths obliquely black-brown with a curved subterminal row of grey streaks. Hind wing basal two-thirds pale grey, outer one-third black-brown. Below.—Fore wing black-brown glossed with metallic bronze basal and cellular areas slightly powdered with yellow scales, a subterminal curved band of white oblong spots.

"Hind wing black-brown strongly glossed with metallic bronze, a white spot at end of cell, basal streak and row of subterminal spots golden yellow.

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"Length of fore wing: ♂ 30 mm., ♀ 27 mm; expanse, ♂ 64 mm., ♀ 58 mm. One ♂, one ♀, Manusela, Central Ceram, 650 metres 1912."

Scent-scale (pl. xx, fig. 22). Long and narrow with thickened edges. Length about six times the width of the base at its widest part. This scale is longer than the scale of the two other species of the group. Base incurved.

Genitalia:—

Valve (pl. ix, fig. 25). Distal edge with a rather small rounded process directed distad. Dorsal edge nearly straight, incurved posteriorly. Cavity of moderate size. Ventral fold very broad with its proximal edge well-defined.

Uncus (pl. 1, fig. 21). Type of Group 1c. Lobes narrow and close together. Tegumen curving gradually outwards and flexed inwards. A narrow type.

Lamina dentata (pl. vi, fig. 5). Long, moderately broad, and bent outwards, the distal ends rounded. Middle of anterior margin strongly incurved, and of the posterior margin strongly excurved. Teeth very strongly developed on the margins, but a large distal area is bare.

Length = *circ.* 1·4 mm., breadth = *circ.* 0·2 mm.

Habitat.—Ceram. First discovered by Herr. Stresemann. Rediscovered by the brothers Pratt in 1919, when they took a good series, especially of variable females. Mount Manusela, 3,000—6,000 feet, October—January.

The types are in the Tring Mus.

27 (62). *D. stresemanni* f. *oenus* Talb. (1920).

Talbot **221**, p. 405 (Ceram).

♂ ♀. Distinguished by the absence of any band on the underside of the hind wing.

Occurs together with the other forms.

Types in the Hill Museum.

27 (63). *D. stresemanni* ♀ f. *mediofasciata* Talb. (1920) (pl. xli, fig. 3).

Talbot **221**, p. 405 (Ceram).

♀. Hind wing below with a broad yellow or yellowish-white discal band from the costa to the inner margin.

Occurs together with the other forms.

Type in the Hill Museum.

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27 (64). *D. stresemanni* ♀ f. *lutea* Talb. (1920).

Talbot **211**, p. 405 (Ceram).

♀. Upperside buff-yellow instead of grey.

Occurs with the other forms at 6,000 feet. Two specimens obtained.

Type in Hill Museum.

27 (65). *D. stresemanni* ♀ f. *basiflava* Talb. (1920).

Talbot **221**, p. 405 (Ceram).

♀. Hind wing below with the proximal area to beyond the cell yellow or yellowish white, some admixture of dark scaling in the basal area.

Occurs with the other forms, and found at 3,000 and 6,000 feet.

Type and three others in the Hill Museum.

28 (66). **D. LECERFI** J. and T. (1922).

Joicey and Talbot **108**, p. 307 (Dutch New Guinea) ♂ ♀ ; **110**, pl. viii, fig. 1.

This species appears to have some affinity with the *geraldina* group, resembling on the underside the *microsticha* forms, but its different scent-scale and genitalia have led us to include it with *stresemanni*.

(Original description).

" ♂. Upperside of fore wing with basal two-thirds white, the outer edge of this area curved inward to costa at vein 6 and oblique from 6 to submedian. Hind wing white with a thin marginal line. Fringes black.

" Underside of fore wing with lower two-thirds of cell from base to apex white, this colour extending as a spot above vein 4 and sometimes reaching the costa as a streak, extending to vein 2, sometimes to 3, and to the inner margin. A series of four subapical spots, lemon-chrome (iv), the larger at the costa. Ground colour fuscous-black (xlvi). Hind wing fuscous-black. A coral-red (xiii) basal spot on the extreme basal edge of costa. One specimen has this spot lemon-chrome. Other spots lemon-chrome ; one in 7 at middle, one in cell below 6, one in 6 near the apex and a costal streak above it ; postdiscal short strigæ in 1c, 2—4, sometimes faint, and a series of antemarginal dots on the folds. A thin pale grey marginal line.

" ♀. Upperside of fore wing with slightly larger distal black area. Hind wing with black apical margin about 2 mm. wide and tapering to vein 5, below which the marginal line is thicker than in the ♂.

" Underside as in the ♂.

" Length of fore wing : ♂ ♀ 24 mm."

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Scent-scale (pl. xx, fig. 23). Similar in shape to the scale of the two other species in this group, but flatter at the base, shorter, and relatively broader.

Genitalia :—

Valve (pl. ix, fig. 26). Apex narrow and incurved. Dorsal edge nearly straight, incurved posteriorly. Ventral edge incurved anteriorly. Ventral fold defined and broad posteriorly. Cavity of moderate size with a large flap.

Uncus (pl. i, fig. 22). Type of Group 10. The single lobe is long, curved and narrow.

Habitat.—Dutch New Guinea: Weyland Mountains. 3,500—5,000 feet, mostly at 4,000 feet, November—January. A series of ♂ ♂ and three ♀ ♀ were taken by the brothers Pratt.

Types in the Hill Museum.

GROUP 5.

This group consists of species inhabiting the mountains of New Guinea. They are of amall size. The underside is usually glossy. The hind wing below is black-brown or bronzy, with sometimes markings of a deeper black; other markings yellow, white or red. A rounded black discal spot is found in several species. Most species are distinguished by having a prominent yellow spot at the base of the costa on the hind wing below; in *microsticha* the basal spot is red. The ♀ is very similar to the ♂, but in most species the light-coloured area on the upperside has a glossy appearance.

Scent-scale very similar to that of Group 4, usually long and narrow with thickened edges. The scale of each species is figured on plates xx, xxi, xxii.

Genitalia.—Three types of *uncus* (Groups 1, 2, 8) are represented, Group 1G being in the majority, see plates i and ii, figs. 23-39. The type represented by *sagessa* (fig. 23) is unique. The type represented by *geraldina* (fig. 24) also occurs in most species of the *chrysomelaena* group. The type represented by *microsticha* and *flavopicta* (figs. 26, 27) occurs also in the Groups 4, 7, 10 and 18 of species. The type represented by *rileyi* and *imitator* (figs. 28, 29) occurs also in Groups 10 and 12 of species. The type represented by the remaining species (excepting *citrona* which could not be examined) is peculiar to them.

The *valve* is characterized by an excavation on the dorsal edge below the apex, usually very strongly marked. This reaches its

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maximum in *sagessa* (pl. ix, fig. 27), which is unique in the length of its apical prolongation.

The group contains 17 species, comprising 28 geographical forms distributed throughout the mountains of New Guinea.

Key to Species.

1. Hind wing below with red submarginal spots ... ... *sagessa*
   Hind wing below without red submarginal spots 2
2. Hind wing with costa red at the base ... ... *microsticha*
   Hind wing with costa yellow at the base 3
3. Hind wing with a discal band in both sexes 4
   Hind wing without a discal band in both sexes 8
4. Hind wing below with the costa yellow at the base only ... 5
   Hind wing below with the costa yellow beyond the base ... *geraldina*
5. Hind wing below with submarginal dots, none of which are prolonged to the margin ... ... *cuningputi*
   Hind wing below with submarginal spots, some or all of which are prolonged to the margin 6
6. Hind wing below with a spot in 7 free from the discal band ... 7
   Hind wing below without a spot in 7 ... ... *citrona*
7. Fore wing below with a yellow discal band ... ... *imitator*
   Fore wing below with the white area extended to the upper margin of the cell ... ... *aroae*
   Fore wing below with the white area not reaching the upper margin of the cell ... ... *pheres*
   Fore wing below black ... ... *fuliginosus*
8. Hind wing below with a red spot in 7 and one in the cell ... *thompsoni*
   Hind wing below with a yellow spot in 7 9
   Hind wing below without a spot in 7 10
9. Hind wing below with a white costal patch ... ... *rileyi*
   Hind wing below without a costal patch ... ... *flavopicta*
10. Hind wing below with a black discal spot... 11
    Hind wing below without a black discal spot ... ... *itamputi*
11. Hind wing below mostly white ... ... *albo-oculatus*
    Hind wing below mostly black or bronzy 12
12. Hind wing below with black submarginal spots ... ... *nigropunctata*
    Hind wing below with or without a broken white submarginal line 13
13. Fore wing below black ... ... *hypomelas*
    Fore wing below with white proximal half ... ... *heroni*

29 (67). **D. SAGESSA** Fruh. (1910).

Fruhstorfer **68**, p. 183, pl. 56f. (British New Guinea).

Delias dives Rothschild **178**, p. 313, pl. ii, fig. 14 ♂ (Aroa River) (Nom. praeocc.).

„ „ Roths., Roths. and Jordan, *Nov. Zool.* xii, p. 461 (1905) ♀.

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Delias diva Fruhstorfer 68, p. 128.

A very distinct species easily recognized by its row of prominent submarginal red spots on the hind wing below.

Original description (vide *D. dives*).

" ♂. Wings white on upperside. Fore wing black from apex of cell distad, costal edge black down to base, white area rounded distally, extending close to apex of SM^2. Hind wing with very thin black distal border, not exceeding 1 mm. in width.

" Underside olive-black, somewhat purplish, especially on hind wing, slightly glossy olive-green. Fore wing: a broad pale yellow band before middle anteriorly, just proximally of cross-veins, gradually widening behind, not reaching costal edge; four submarginal dots also pale yellow, the second the larger. Hind wing: median band deeper yellow than on fore wing, terminating behind at a large scarlet abdominal marginal spot; moreover, a submarginal row of five scarlet spots, rounded, nearly touching fringe.

" ♀. Similar to the ♂; the black apical area of the fore wing, *above*, is wider, and the hind wing has a broad black distal border, which slightly widens costally. There are often white submarginal dots on both wings, those of the hind wing being slightly pinkish. The white area is feebly yellowish. The sexes are alike on the underside."

Length of fore wing, ♂ 22—24 mm.; ♀ 24 mm.

Scent-scale (pl. xx, fig. 24).

Short and broad, but narrow at the base, edges not much thickened.

Genitalia:—

Valve (pl. ix, fig. 27). Distal edge produced to a very long finger-like process, narrowing anteriorly, and curved slightly distad. Dorsal edge strongly incurved, with a small posterior rounded prolongation. Ventral fold broad and well sclerotized with a sharply defined inner edge. Cavity not seen.

Uncus (pl. i, fig. 23). Type of Group 8. Middle lobe short and narrow, projecting slightly outwards and above the dorsum, the outer lobes being fused with the carina. Tegumen gradually broadening posteriorly where it is broadly inflexed.

Habitat.—South-west British New Guinea: Owgarra; Angabunga River, 6,000 feet, November—February; North British New Guinea: Biagi, 5,000 feet, January—April.

First discovered by A. S. Meek. Type ♂ from Owgarra, May. Type ♀ from the Angabunga, in the Tring Museum.

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30 (68). **D. GERALDINA** Sm. (1894) (pl. xli, figs. 4—8).

Delias geraldina Grose Smith **193**, p. 585 (German New Guinea) ♀.
„ „ Sm., Smith and Kirby **200**, p. 16, *Del.* v, figs. 1 ♂, 2, 3, ♀.
„ „ Sm., Butler **14**, p. 155.
Delias emilia Rothschild **178**, p. 314 (Nom. nov.).
Delias geraldina emilia Roths., Jordan **114**, p. 589 (Oetakwa River).
Delias diva (*sagessa*) *emilia*, Roths., Fruhstorfer **68**, p. 128.
Tachyris weiskei Ribbe **166**, p. 330 (Aroa River) (Nom. praeocc.).
Delias weiskei Ribbe, Smith and Kirby **203**, *Del.* pl. 8, figs. 6, 7, 8, ♂ ♀.

The name *weiskei* was given by Ribbe to this species, but as *weiskei* was praeoccupied, the name was changed by Rothschild to *emilia*. As specimens of *geraldina* were scarce the variation in this species was not known and *emilia* was regarded (rightly then) as a race. Latterly however, more specimens from the area of the *geraldina* locality were accumulated, as well as a good series of *emilia*. After carefully subjecting this material (chiefly in the Tring and Hill Museums) to a comparative examination, we cannot define any characters for separating the specimens grouped under the two names.

The species is distinguished by its white upperside with black distal area on the fore wing and the hind wing without a marginal border in the ♂. The hind wing below has a yellow cell-spot and a white discal band marked with yellow bars. There is a row of yellow submarginal spots.

♂. Upperside white. Fore wing with black distal area not reaching the cell and narrowed to the tornus, its edge slightly curved and sharply defined. Hind wing without a marginal border but with a fine black line on the margin; the fringes are black.

Underside of fore wing with proximal two-thirds white. A blackish-brown costal stripe extending along the upper half of cell, and touching its lower margin more or less broadly near the base, sometimes filling the cell as far as vein 3, it curves on the discocellulars forming a spot which is of variable size. The blackish-brown distal area often extends to and becomes merged with the discoidal spot.

The amount of white area which remains in the cell or which extends beyond the cell is of variable extent. There is a row of five small yellow submarginal spots.

Hind wing with blackish-brown ground-colour with markings sulphur-yellow or of a deeper colour. A discal band of variable width,

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white, marked with six short yellow bars; this band is distally excurved at the middle, with a sharply defined edge. It is joined to a yellow costal stripe which reaches the base, and posteriorly it is connected with a yellow inner marginal area often powdered with the ground-colour. Outer half of cell occupied by an ovate spot of variable size. A row of six somewhat rounded submarginal spots of nearly equal size, placed near the margin.

♀. Upperside similar to the ♂ but with a yellow tinge. The black area of the fore wing usually broader. Hind wing with a narrow black marginal border which is wider anteriorly.

Underside similar to the ♂. White area of fore wing with a slight yellow tinge. Hind wing discal band sometimes broader than in the ♂, in the holotype it has become distally much broader. Submarginal spots orange, smaller than in the ♂.

Length of fore wing: ♂ 23—25 mm., ♀ 23 mm.

Scent-scale (pl. xx, fig. 25). Long and narrow with thickened and nearly straight edges, about seven times as long as the width of the base.

Genitalia:—

Valve (pl. ix, fig. 28). Distal edge with a moderately long curved process, and proximally with a deep excavation. Dorsal edge nearly straight, shortly excurved posteriorly. Ventral fold rather narrow, with weakly sclerotized proximal edge. Cavity not seen.

Uncus (pl. i, fig. 24). Type of Group 2. Middle lobe short and narrow, outer lobes longer and much broader, slightly curved inward. Tegumen broadening posteriorly where it is inflexed.

Habitat.—Dutch and British New Guinea. North-east Dutch New Guinea: Angi Lakes, Arfak Mountains, 6,000 feet, March; Momi, 4,000 feet, November and December; Wandammen Mountains, 3,000—4,000 feet, November; Coast District, Geelvink Bay, November; Warmasin, 6,000 feet, March; Mount Misresi, 3,000 feet, January.

North Dutch New Guinea: Menoo River, Weyland Mountains, 3,500—5,000 feet, December to January; Dewaro Village, Weyland Mountains, 3,500 feet, June; Djalan River, about 25 miles inland from South Geelvink Bay, May and June.

South Dutch New Guinea: Utakwa River, Snow Mountains, up to 3,500 feet, October and December.

North-east British New Guinea: Saddle Mountains; Berg Gehr; Rawlinson Mountains.

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North British New Guinea: Hydrographer Mountains, 2,500 feet, May; Biagi, 5,000 feet, January—April.

South-west British New Guinea: Angabunga River, 6,000 feet, November—February; Aroa River, April and May.

This is a common species, but the female is rare. The type specimen (a ♀, see fig. 7) was obtained by Webster in 1894 on the Saddleberg. The species was afterwards taken in numbers by the collectors Pratt and Meek.

The specimens figured are as follows:—

Fig. 4 = ♂ from North-east British New Guinea: Berg Gehr (Dr. Werner).

Fig. 5 = ♂ from North British New Guinea: Biagi, Mambare River (Meek).

Fig. 6 = ♀ from North Dutch New Guinea: Weyland Mountains, Menoo River, 3,000—4,000 feet, December (Pratt Bros.).

Fig. 7 = ♀ holotype.

Fig. 8 = Upperside of fig. 6.

Holotype in the Hill Museum. The ♂ neallotype (*weiskei* Ribbe) in the Tring Museum from the Aroa River.

31 (69). D. **EUDIABOLUS** Roths. (1915) (pl. xli, figs. 9, 10).

Rothschild 180, p. 179 (Upper Aroa River).

This species very much resembles *ladas* Sm. but may be easily distinguished by the sharply-defined yellow basal spot in cellule 8 on the hind wing below. The abdomen is white below, in *ladas* it is yellow.

The species is only known from the Aroa River and the Hydrographer Mountains, and is rare.

(Original description).

"♂. Resembles a minute *ladas*. Above, fore wing more pointed than in *ladas*, and termen much straighter; the black edge of hind wing is narrower. Below, the apical dark area of fore wing is much wider and basicostal yellow streak on hind wing is clearer yellow.

"♀. Above, all dark margins are much narrower and apical area is edged inwardly with yellow, *not* found in *ladas*. Below the abdomen is white, while in *ladas* it is yellow; the apical area of fore wing is wider and the basicostal yellow streak on hind wing is clear yellow.

"Length of fore wing; *eudiabolus*, ♂ 21·5, ♀ 23 mm.—expanse ♂ 47, ♀ 50 mm.; *ladas*, ♂ 34, ♀ 29 mm.—expanse, ♂ 74, ♀ 64 mm."

Scent-scale (pl. xx, fig. 26). Resembles somewhat the *sagessa* scale

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which is still narrower than *ladas*, the latter with a larger disc than either. Narrower than *sagessa* and less dense in texture.

Genitalia:—

Valve (pl. ix, fig. 29). Distal edge with a short and narrow process, and proximally with a deep excavation. Dorsal edge nearly straight, slightly excurved posteriorly. Ventral fold rather narrow, with defined proximal edge. Cavity small.

Uncus (pl. i, fig. 25). Type of Group 1G. Middle lobe very broad, shortly narrowed and curved inward at the centre. Outer lobes short and narrow. Tegumen sharply excurved and thickened. A short and broad type.

Habitat.—North British New Guinea: Hydrographer Mountains, 2,500 feet, March, 1918, collected by Eichhorn Bros.

South-west British New Guinea: Upper Aroa River, February and March, 1903, collected by A. S. Meek.

We figure the ♀ allotype (fig. 9) and a ♂ from the Aroa River. The types are in the Tring Museum.

32. **D. MICROSTICHA** Roths.

A common species, distinguished by the red spot at the base of the costa on the hind wing below in which it differs from the very similar *flavopicta* Jord. Occurs in British and Dutch New Guinea, whilst on the other hand *flavopicta* is found only in the Arfak and has not been recorded from any locality inhabited by *microsticha*. These two appear to be races of the same species, but differences in structure not usually found in races have decided us to treat these as distinct species.

Two races are known.

32 (70). *D. microsticha microsticha* Roths. (1904).

Delias microsticha Rothschild **178**, p. 315, pl. ii, figs. 18, 19 ♂ (Owgarra).

Delias microsticha Roths., Roths. and Jordan **113**, p. 462 (♀): Fruhstorfer **68**, p. 135, t. 56e; Joicey and Talbot **108**, p. 307.

(Original description).

" ♂. Wings, upperside white. Fore wing: costal edge and a broad distal border black; this border gradually narrowed posticad, reaching as far proximad as base of R^1 and being only 1 to 1½ mm. broad at SM^2, concave proximally, slightly incised at the veins. Hind wing with thin black distal border.

" Underside purplish olive-black, glossy on hind wing and at apex

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of fore wing. Fore wing: a broad streak in cell, gradually narrowed to base, two spots beyond apex of cell, and a series of subapical respectively submarginal dots. Hind wing: a basal costal spot crimson; a spot in middle of costal margin, a row of submarginal dots, a spot in cell beyond middle, and a row of thin short streaks on disc yellow.

" ♀. The black borders to the upperside of the wings are broader in the ♀ than in the ♂, the fore wing bearing a row of white, or yellowish-white, submarginal dots and the white area being slightly washed with yellow. The underside is variable. Some ♀ ♀ resemble the ♂, but there is always a yellowish patch at hinder margin of fore wing beyond middle and a vestige of a band across the disc of hind wing. In a second form of the ♀ the cell of the fore wing and the whole area behind it are yellow, usually washed with orange; in a third form there is, besides, a sharply-defined yellowish-white discal band on hind wing, the inner edge of the band being straight and the outer edge curved."

The third form of ♀ noted above has been named *albifascia*.

Length of fore wing: ♂ 25—26 mm., ♀ 24—25 mm.

Scent-scale (pl. xxi, fig. 30). Very long and narrow with strongly thickened edges; more than seven times as long as the width at the base, longer than any species of this group. These scales extend over most of the black area of the fore wing, but here they are shorter and a little broader.

Genitalia:—

Valve (pl. ix, fig. 30). Distal edge with a narrow and short straight process; proximally incurved. Dorsal edge excurved. Ventral fold posteriorly very broad and strongly developed, proximally narrow with a dentate edge. Cavity small with a large flap.

Uncus (pl. i, fig. 26). Type of Group 1c. Lobes narrow, spreading, and of about equal length. Tegumen slightly curved outwards posteriorly and flexed inward.

Lamina dentata (pl. vii, fig. 59). Short and moderately narrow, bent outwards, distal ends rounded. The middle of the anterior margin is strongly incurved, and of the posterior margin sharply excurved. Teeth strongly developed on the margins, weaker on the lobes. Length = *circ.* 1 mm., breadth = *circ.* 0·16 mm.

Habitat.—North British New Guinea: Biagi, 5,000 feet, February.

South-west British New Guinea: Owgarra, May 1903; Angabunga River, 6,000 feet, November—February.

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North-east Dutch New Guinea: Wandammen Mountains, 6,000 feet, November.

North Dutch New Guinea: Weyland Mountains, Menoo River, 3,500—5,000 feet, November and December; Mount Kunupi, 6,000 feet, November—January.

South Dutch New Guinea: Mount Goliath, 5,000—7,000 feet, January and February.

The specimen from the Wandammen Mountains is like *terranea* from the Rawlinson Mountains, but we must assume it to be the *terranea* form occurring there as an aberration. The holotype was taken at Owgarra, north of the head of the Aroa River, May, 1903. The ♀ neallotype was taken on the Angabunga River, 6,000 feet, November, 1904—February, 1905.

Types in the Tring Museum.

32 (71). *D. microsticha* ♀ f. *albifascia* Talb. (1928) (pl. liv, fig. 7).

Talbot 222, p. 38 (Weyland Mountains).

Rothschild and Jordan 113, p. 462 (part).

(Original description).

"Differs from *microsticha* ♀ below in two important characters. The fore wing with an orange-yellow basal area, and the hind wing with a white discal band which is sharply defined with a nearly straight proximal edge and with the outer edge excurved at cellule 4; it is marked with yellow bars, and in specimens from Dutch New Guinea more marked with orange."

Habitat.—Occurs with the typical form in British and Dutch New Guinea. Type in the Hill Museum from the Weyland Mountains: Mount Kunupi, 6,000 feet, December—January. We figure the type.

(To be continued.)

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EXPLANATION OF PLATE XXXVII.

(All figures are slightly reduced.)

		Species No.
Fig. 1.	*D. agoranis* Sm., ♂	1
„ 2.	*D. singhapura* Wall., ♂ holotype ...	2
„ 3.	*D. themis soteira* Fruh., ♂	5
„ 4.	*D. kuehni kuehni* Honr., ♂	8
„ 5.	*D.* „ „ ♀	8
„ 6.	*D. georgina simanabum* Hag., ♂ neallotype	12
„ 7.	*D.* „ „ ♀ ...	12
„ 8.	*D. dumasi* Roths., ♀ holotype	22

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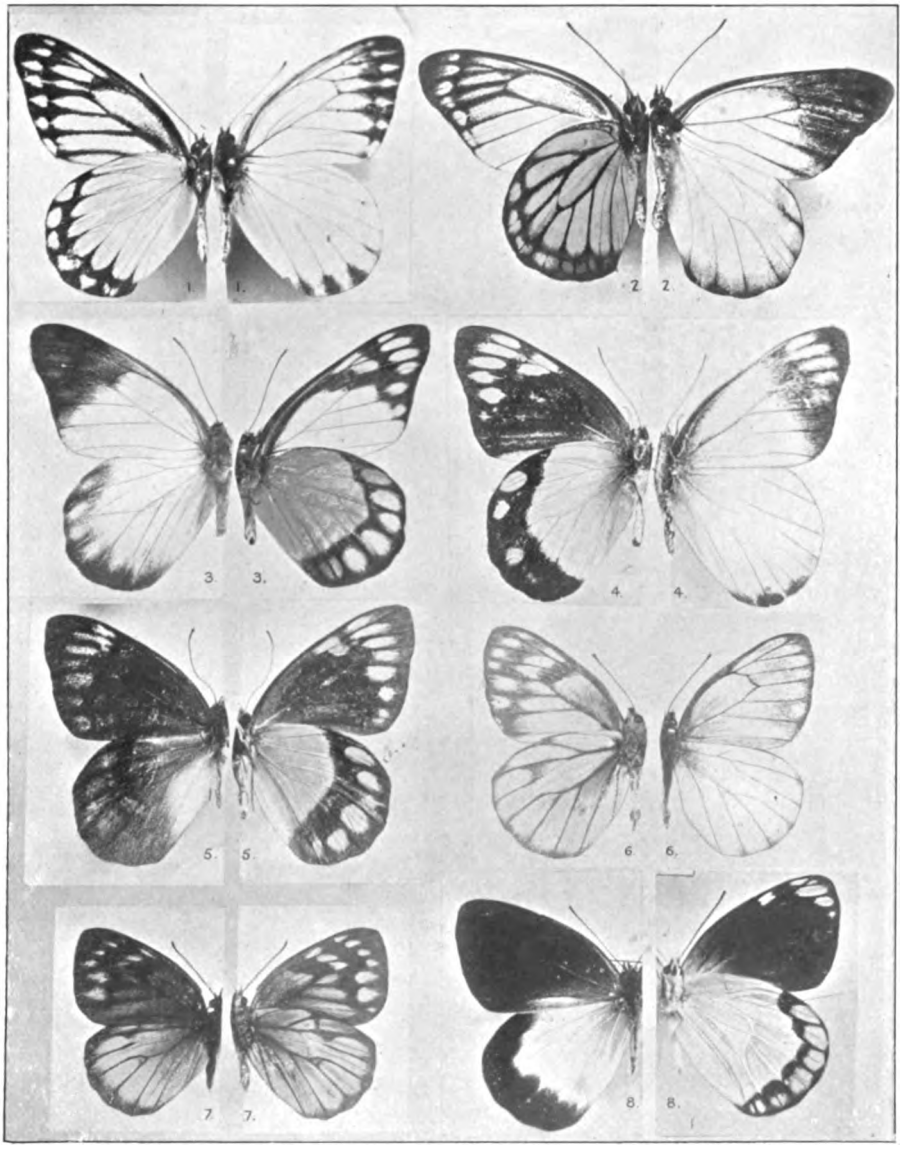

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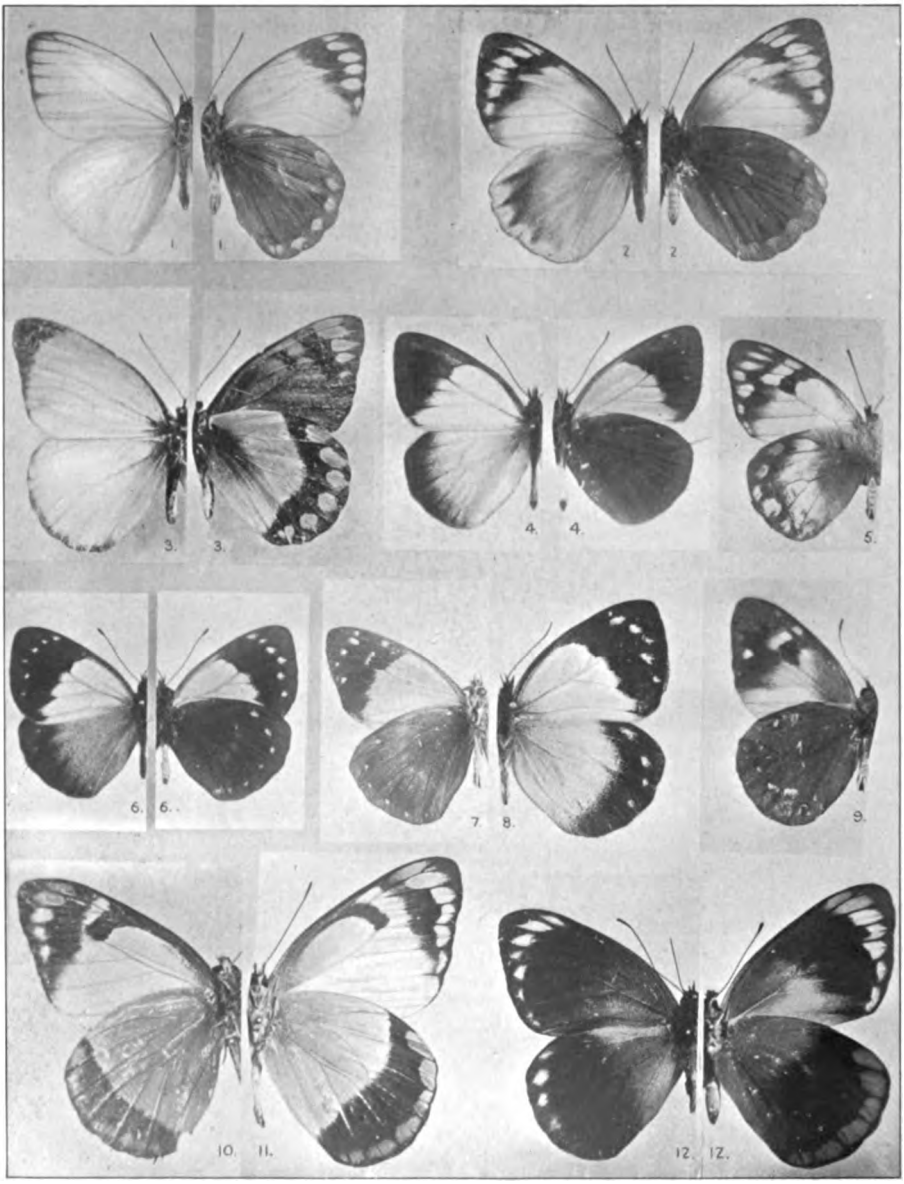

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EXPLANATION OF PLATE XXXVIII.

(All figures are slightly reduced.)

		Species No.
Fig. 1.	*D. manuselensis* Talb., ♂ holotype ...	25
,, 2.	*D.* ,, ♀ allotype	25
,, 3.	*D. waterstradti* Roths., ♂ holotype ...	27
,, 4.	*D. momea huphinoides* J. and T., ♂ holotype	29
,, 5.	*D. fruhstorferi* Honr., ♂	31
,, 6.	*D. momea huphinoides* J. and T., ♀ allotype	29
,, 7.	*D. momea momea* Bdv., ♂	30
,, 8.	*D.* ,, ,, ♀	30
,, 9.	*D. nysa nysa* Fabr., ♂	32
,, 10.	*D. ribbei connectens* Talb., ♂ holotype ...	34A
,, 11.	*D. maudei* J. and N., ♂	35
,, 12.	*D.* ,, ♀	35

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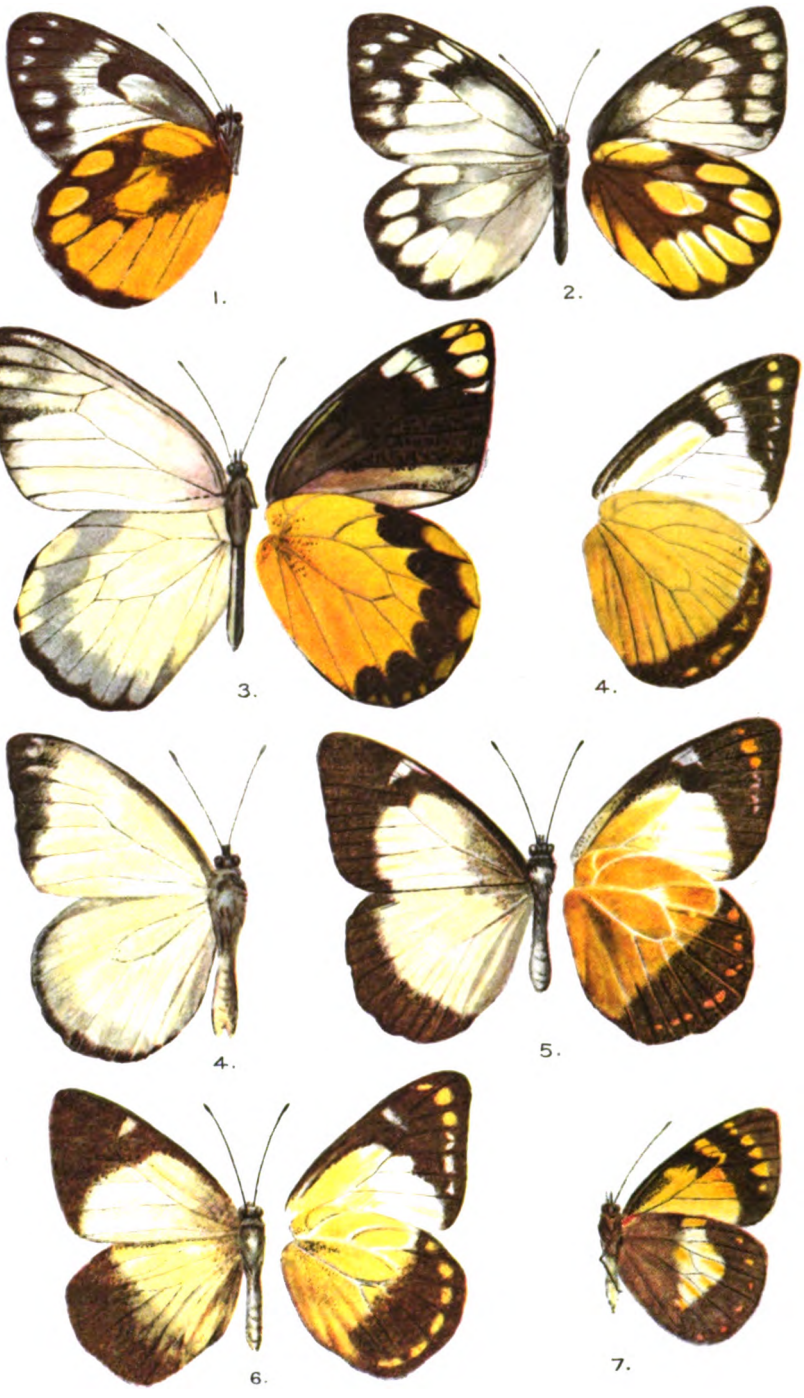

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EXPLANATION OF PLATE LIV.

		Species No.
Fig. 1.	*D. georgina orphne* Wall., ♂ (Mt. Ophir) ...	10
„ 2.	*D. georgina* Feld., ♀	14
„ 3.	*D. schuppi* Talb., ♂ type	21
„ 4.	*D. dice* Voll., ♂ type	44
„ 5.	*D.* „ „ ♀ allotype.	
„ 6.	*D. dice* ♀ f. *latoclavata* V. Eecke, type ...	42
„ 7.	*D. microsticha* ♀ f. *albifascia* Talb., type ..	71

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EXPLANATION OF PLATE LV.

		Species No.
Fig. 1.	*D. imitator* Kenr., ♂	76
„ 2.	*D.* „ „ ♀.	
„ 3.	*D. carstenziana* Roths., ♂	102
„ 4.	*D. cuningputi jordani* Kenr., ♀	87
„ 5.	*D. castaneus* Kenr., ♂	106
„ 6.	*D. pratti* Kenr., ♂	107
„ 7.	*D. kummeri* Ribbe, ♂	131
„ 8.	*D. callima* R. and J., ♀	129
„ 9.	*D. joiceyi* Talb., ♂ type	142
„ 10.	*D.* „ „ ♀ allotype.	
„ 11.	*D. caroli* Kenr.	108

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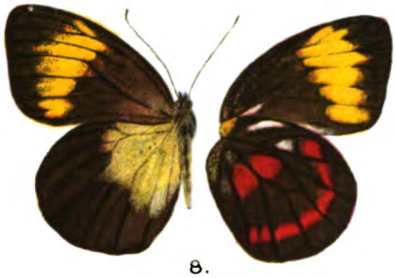

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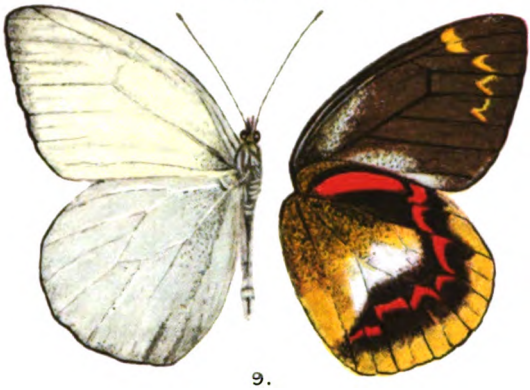

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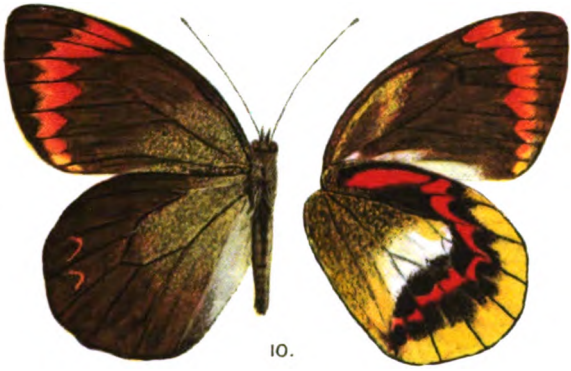

10.

11.

A. E. Prout, del.

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QL
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A

MONOGRAPH

OF THE

PIERINE GENUS *Delias*

BY

G. TALBOT

PART IV

Pages 168-219. Plates xxxix, lvi, lvii, lxviii, lxix, lxx.

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Lepidoptera
Rhopalocera
10-21-35
31957

EXPLANATION OF PLATE XXXVII.

(All figures are slightly reduced.)

		Species No.
Fig. 1.	*D. agoranis* Sm., ♂	1
„ 2.	*D. singhapura* Wall., ♂ holotype ...	2

Pages 109 to 116 comprise
"Explanation of Plates I to VII."

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32 (72). *D. microsticha terranea* Talb. (1928).

Talbot **222**, p. 43 (Rawlinson Mountains) ♂.

In this slightly differentiated race the black margin of the hind wing is a little wider and more extended posteriorly.

(Original description).

"♂. Upperside of hind wing with the narrow black margin (broader though than in typical *microsticha*) extending to vein 3 or 2.

"Underside of hind wing and apex of fore wing paler than in the typical form. Hind wing with the submarginal spots in 2 and 3 mostly orange, and in two specimens they are red."

Habitat.—North British New Guinea: Rawlinson Mountains. Described from a series of ten ♂♂ in the Tring Museum. The Hill Museum has also received four ♂♂ from the Cromwell Mountains.

33 (73). **D. FLAVOPICTA** Jord. (1911) (pl. xli, fig. 11).

Delias microsticha flavopicta Jordan **114**, p. 593 (Nom. nov.).

Delias rothschildi Kenrick **116**, p. 180, pl. vii, figs. 2 ♂, 6 ♀ (Arfak) (Nom. praeocc.).

This species is very similar to *microsticha* from which it is distinguished by the yellow spot at the base of the costa. The ♂ is common.

♂. Upperside creamy-white with black margins. Black area of fore wing of variable width, sometimes reaching the end of the cell, its edge is sharply defined and slightly curved. The androconia extend also over the black area where they do not differ in colour but are definitely shorter and a little broader just as in *microsticha*. The area occupied by these scales is more extensive than it is in *microsticha*. Hind wing with black marginal border about 4 mm. wide on vein 5, narrower posteriorly and not quite reaching vein 2.

Underside much as in *microsticha*. Hind wing with a yellow basal costal spot. The posterior distal area usually dusted with yellow, sometimes very considerably, and forming a better defined part of a shadowy postdiscal band such as is rendered complete in one of the female forms. There are sometimes some yellow postdiscal dots in 1c—4 but never the well-defined dashes found in *microsticha*.

♀. Upperside usually with a yellow tinge. Broader black borders than in the ♂; fore wing sometimes with a black discocellular spot. Underside very similar to the ♂. Fore wing with proximal three-fourths of inner margin white to the submedian fold, this area produced

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at its distal end by some yellow scaling reaching veins 3 or 4. Spots of the hind wing smaller than in the ♂, and sometimes with a more distinctly defined postdiscal band.

Scent-scale essentially of the same form as in *microsticha*, and similarly the scales on the distal area of wing are shorter and broader.

Genitalia :—

Valve (pl. ix, fig. 31). Distal edge with a short curved process and proximally with a deep excavation. Dorsal edge nearly straight, rounded posteriorly. Ventral fold strongly developed posteriorly, its proximal edge toothed. Cavity not seen.

Compared with *microsticha*, the proximal excavation is deeper and the process is narrower. The ventral fold has fewer and broader teeth and is less strongly developed; in *microsticha* the ventral edge is much longer.

Uncus (pl. i, fig. 27). Type of Group 1c. The lobes are narrow, equal, and close together. Tegumen broadens posteriorly and is flexed inward.

Compared with *microsticha* the lobes are closer together and the tegumen is more constricted anteriorly.

Habitat.—Dutch New Guinea, in the Arfak Mountains. Momi, 4,000 feet, November and December; Warmasin, 6,000 feet, March; Angi Lakes, 6,000 feet, January—March. First discovered by the collectors Pratt. Type ♂ (fig. 11) in the Hill Museum from Momi (*rothschildi* Kenr.). The ♀ described by Kenrick belongs to the form *albifascia*, and is also in the Hill Museum.

33 (74). *D. flavopicta* ♀ f. *albifascia* Talb. (1928).

Talbot 222, p. 38 (Arfak).

Delias rothschildi Kenrick 116, p. 181, ♀, pl. vii, fig. 6.

This represents the similar ♀ form found in *microsticha*. The proximal area of the fore wing below is paler yellow than in the *microsticha* form, the band of the hind wing is less marked with yellow, and the submarginal dots are yellow instead of orange.

Occurs together with typical ♀.

34 (75). **D. RILEYI** J. and T. (1922).

Joicey and Talbot 108, p. 306, pl. vii, fig. 3 (Weyland Mountains).

This species is distinguished by the white proximal half of the fore wing below, and by the hind wing bearing two costal spots edged

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outwardly with yellow, the distal spot being much larger than the other, and indicating a relationship in pattern with the banded species *cuningputi*, &c.

(Original description).

" ♂. Upperside of fore wing with white proximal half which projects distad along vein 2, slightly indented on veins 2 and 3 and more so on vein 4. The cell is only slightly invaded at its lower and upper angle. Hind wing with narrow black margin, broader between costa and vein 5, then tapering off and becoming merged in the white area.

" Underside of fore wing with white proximal half. A basal costal streak of cadmium-yellow (iii), where in *jordani* there is black scaling. The white area does not reach end of cell, and below vein 4 reaches farther distad than on the upperside. A subapical costal white stripe, curved outwards to vein 5, thence downwards to 4 and just below this vein connected by faint scaling to the edge of the white area. A submarginal series of seven dots, the anterior and subapical four yellow, the lower ones white. Hind wing with brown colour more blackish than in *jordani*, markings deeper or cadmium-yellow. Costa white, yellow at extreme base. A rounded yellow spot slightly white on its distal edge in cellule 7 and touching vein 8; a little beyond this an oblong white spot posteriorly edged with yellow, reaching from costa nearly to vein 6; a small rounded spot in the cell below vein 6; a postdiscal series of intranervular streaks in 1c, 2, 3, 4 and 5, with some faint yellow scaling on either side of them and a faint distal edging of white, outlining a band which would occupy the same position as the band found in *jordani*. A submarginal series of six yellow spots.

" Length of fore wing : 28 mm."

Scent-scale (pl. xx, fig. 27). Shorter and broader than in most others of the group. Thickened edges and broad at the base. Disk small.

Genitalia :—

Valve (pl. ix, fig. 32). Distal edge incurved. Dorsal edge very slightly incurved, but sharply excavated posteriorly. Ventral fold strongly developed posteriorly. Cavity small.

Uncus (pl. i, fig. 28). Type of Group 1B. Lobes narrow and equal, outer ones curved inward. Tegumen incurved and posteriorly excurved.

Habitat.—North Dutch New Guinea : Weyland Mountains, the Menoo Valley, 6,000—8,000 feet, January, 1921. A single ♂ only was taken, discovered by the collectors Pratt. Unique type in the Hill Museum.

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35 (76). **D. IMITATOR** Kenr. (1911) (pl. lv, figs. 1, 2).

Kenrick 117, p. 18, pl. iii, fig. 3, ♂ (Arfak Mountains).

This species is distinguished from all others by the yellow band on the fore wing and the yellow hind wing with black marginal border.

♂. Upperside black with pale sulphur-yellow markings. Fore wing with a narrow postdiscal band from the inner margin to vein 4, beyond which is a square-shaped spot in 5 and a vestigial spot in 6; this band is more sharply defined on its outer edge. Three or four submarginal dots, the one in 3 larger than the others. A subapical spot in 6, a dot above it, and a streak below it near the costa. The androconia extend as far as these submarginal spots.

Hind wing pale sulphur-yellow with a broad black marginal border (over 5 mm. wide on vein 4) from the costa to below vein 4, its edges sharply defined, the posterior edge (in cellule 3) straight. Three submarginal dots in 4—6. Costal edge white. Basal area of cellule 7 and base of 6 blackish-brown.

Underside with paler ground-colour than above. Fore wing postdiscal band very much broader and all other markings larger than above and white with a yellow tinge. There are 5 well-defined submarginal spots.

Hind wing with a creamy-white postdiscal band from the costa to inner margin, constricted at vein 6, its outer edge scalloped, its inner edge curved to vein 6, straight from 6 to 4, thence angled inwards and cut by one of the yellow posterior stripes. Three submarginal spots as above but larger, and three submarginal spots in 1c (double), 2 and 3, the upper two very large and ovate. Cellule 8 white with a small yellow basal spot. A small yellow subcostal spot in 7, and a larger one in the end of the cell. A small yellow nebulous spot with a tuft of grey hair in the base of the cell. A thin yellow distal stripe on the band in areas 1c, 2 and 3, represented beyond the band by black. The first submedian is thinly edged with yellow, the lower submedian with white. Fringe white at the lower 5 submarginal spots.

♀. Resembles the ♂. Wings more rounded. Fore wing with broader postdiscal band, the two spots above it forming a bar obliquely placed. Hind wing with broader dark margin and a large submarginal spot cut off in cellule 3.

Underside as in the ♂, with slightly broader bands, the one on the hind wing being whiter than in the ♂.

Length of fore wing: ♂ 25—27 mm., ♀ 25—26 mm.

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Very constant, but the cell-spot on the hind wing below is sometimes joined to the discal band.

Scent-scale (pl. xx, fig. 28). Narrower than in *rileyi*, and with a slightly larger disk.

Genitalia:—

Valve (pl. x, fig. 33). Distal edge with a short process which is very narrow anteriorly; a deep proximal excavation. Dorsal edge nearly straight, rounded posteriorly. Ventral fold moderately developed posteriorly with weak proximal edge. Cavity small with large flap.

Uncus (pl. i, fig. 29). Type of Group 1B. Middle lobe longer and broader than the outer lobes. Tegumen gradually broadening posteriorly and flexed inward.

Lamina dentata (pl. vi, fig. 19). Short and moderately narrow, bent outwards, distal ends rounded. The middle of anterior margin slightly convex, of the posterior margin strongly excurved. Teeth moderate, leaving a broad bare middle area. Length = *circ.* 0·9 mm., breadth = *circ.* 0·13 mm.

Habitat.—North-east Dutch New Guinea: Arfak Mountains. First taken by the collectors Pratt in January, 1909. Also obtained by them later at Warmasin, 6,000 feet, March, 1910, and at the Angi Lakes, February—March, 1914.

The types are in the British Museum.

36. D. HYPOMELAS R. and J.

This species is characterized by the smoky-black underside. The hind wing has a basal yellow costal spot, a black discal patch, and a broken submarginal white line. In *rubrostriata* the hind wing is marked with red stripes.

The species is closely related to *heroni* and *itamputi* both in pattern and structure.

Four races are known in Dutch and British New Guinea.

36 (77). *D. hypomelas hypomelas* R. and J. (1907).

Delias itamputi hypomelas Rothschild and Jordan **185**, p. 190 (Biagi); Jordan **114**, p. 589, ♂ ♀.

Delias hypsomelas " R. and J. i, 1.", Fruhstorfer **68**, p. 129, pl. 56f.

♂. Upperside creamy-white with broad black distal area on the fore

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wing and narrow black margin on the hind wing. The black area on the fore wing reaches the discocellulars.

Underside smoky-black. Fore wing with the inner margin white, sometimes some white scaling extending to vein 2. Two yellow subapical spots in 6 and 8, the upper one much the larger, sometimes a yellow dash in 5.

Hind wing with costa yellow at the base, forming a well-defined rounded spot. A white submarginal line, broken at the veins, from vein 7 to 2 or just below it. A black discal patch, just entering the end of the cell, usually lying between veins 3 and 5 or 6.

♀. (Original description vide Jordan 114).

"This sex is represented in the Tring Museum by two specimens, the only ones known. Both have orange subapical dots on the upper surface of the fore wing and traces of two more, and the proximal area on both wings is white, not yellow as in the ♀ of *itamputi*. In one specimen the white area reaches, on the fore wing, from the hind margin to near the apex of the cell, occupying the greater part of the cell, the black outer border measuring 4·5 mm. at SM^2; the black marginal band of the hind wing is 5·5 mm. broad in front and reduced to a line at the anal margin. The second specimen is black for the greater part, the white area of the fore wing being restricted to the base and hindmargin and that of the hind wing extending only to the apex of the cell, both areas being very diffuse at the edges and much powdered with black scales."

Length of fore wing: ♂ 22—25 mm., ♀ about the size of *itamputi* ♀.

Scent-scale (pl. xx, fig. 29). Long and narrow with thickened edges and moderately large disk, more like the scale of *itamputi* than *heroni*.

Genitalia:—

Valve (pl. x, fig. 34). Distal edge with a short triangular process. Dorsal edge nearly straight, rounded posteriorly. Ventral fold broad with defined proximal edge. Cavity not seen.

Uncus (see *rubrostriata*). Group of 16.

Lamina dentata (see *rubrostriata*).

Habitat.—North British New Guinea: Biagi, Mambare River, 5,000 feet, January—April. Discovered by A. S. Meek.

Types (and the two ♀ ♀ at present known) in the Tring Museum.

36 (78). *D. hypomelas rubrostriata* J. and T. (1922).

Joicey and Talbot 108, p. 312 (Weyland Mountains), ♂ ♀; 110 (pl. viii, fig. 2).

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(Original description).

" This form is distinguished from *hypomelas hypomelas* Jord., and from *h. conversa* Jord., by the red streaks on the hind wing below.

" ♀. Upperside as in *conversa*, the black margin of the hind wing a little wider between veins 4 and 6.

" Underside of fore wing as in the other forms. The black post-cellular shade more as in the type form and not reaching below vein 4. The white inner margin does not extend above the submedian except for some scattered white scales in some specimens. Hind wing with ground-colour as in the other forms. Post-cellular black spot smaller than in *conversa* and more as in the type form, between vein 4 and not quite to vein 6, and more or less extending into the cell where it joins a more or less defined black cell-streak. The cell-streak forms an ovate spot in the cell, scaled with red. White marginal spots as in the other forms. Streaks of nopal red (i) on a black ground in cellules 1c, 2, 3, 4, 5, 6 and 7, those in 4 and 5 short and indistinct, the one in 7 the longer and most heavily marked. In some specimens the red streaks are reduced to some scattered red scaling, and in all worn specimens they are obsolete. It seems that these red scales are easily lost and may represent quite a recent development in comparison with the other markings.

" ♀. Upperside as in *conversa* but with a distinct yellow tinge on the inner margin of hind wing. Underside as in the ♂, but the white inner margin of fore wing broader as in *conversa* ♀."

The red markings are more strongly developed in the ♀, in some males they are vestigial.

Scent-scale (see *hypomelas*).

Genitalia:—

Valve (see *hypomelas*).

Uncus (pl. i, fig. 30). Type of Group 1G. Middle lobe triangular, longer and broader than the outer ones. Tegumen excurved posteriorly and flexed inward.

Lamina dentata (pl. vii, fig. 50). Rather short and narrow, bent outwards, distal ends rounded. The middle of the anterior margin strongly incurved, and of the posterior margin sharply excurved. Teeth well developed on the margins, small on the lobes. Length = *circ.* 0.15 mm., breadth = *circ.* 0·13 mm.

Habitat.—North Dutch New Guinea: Weyland Mountains, Menoo River, 3,500—5,000 feet, November—January; Mount Kunupi, 6,000 feet, November—December. Discovered by the collectors Pratt who

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obtained a good series of both sexes. The types, from Mount Kunupi, are in the Hill Museum.

36 (79). *D. hypomelas conversa* Jord. (1911).

Delias itamputi conversa Jordan **114**, p. 589 (Mount Goliath) ♂ ♀.

(Original description).

" ♂ ♀. Alis posticis subtus pallidioribus macula nigra maiore ornatis distinguenda.

" ♂. The black border of the hind wing is, on the whole, a little wider than in *D. i. hypomelas*. The underside of the hind wing has a more distinct bronze tone than in *D. i. hypomelas*, and the black central patch always extends from near R^1 to M^2, being usually continuous.

" ♀. The white area of the fore wing above is sharply defined, and reaches to the lower angle of the cell, the black outer border having a width of 2 to 3 mm. before the hind margin. The area is either silvery-white or has a yellowish tone, and is always glossy. There are one or two very pale yellowish subapical dots, and often traces of one or two more. The border of the hind wing is narrower than in the ♀ of *D. i. hypomelas*, measuring in the centre 2 mm. or less, seldom 2·5.

" A long series of both sexes from Mount Goliath."

This race more resembles the name-typical race, but has a larger black discal patch on the hind wing.

Habitat.—South Dutch New Guinea: Mount Goliath, 5,000—7,000 feet, February. Discovered by A. S. Meek.

Types in the Tring Museum.

36 (80). *D. hypomelas rawlinsoni* Talb. (1928).

Talbot **222**, p. 43 (Rawlinson Mountains), ♂ ♀.

(Original description).

" ♂ ♀. Upperside with broader black margins to both wings. Fore wing below, with the inner white area not extended above the submedian. Submarginal spot in 6 white.

" Allied to *conversa* Jord., from Mount Goliath."

Habitat.—North British New Guinea: Rawlinson Mountains. Described from a series of 15 ♂♂ 1 ♀ in the Tring Museum.

37. **D. HERONI** Kenr.

Distinguished by the large yellow basal spot on the hind wing below; this spot extends into the base of cellules 6 and 7. The black discal patch is very sharply defined. The fore wing below has the proximal area white.

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Only known from the Arfak Mountains, where it was discovered by the collectors Pratt. A good series was obtained. The form *albo-oculatus* J. and N. occurs with it in lesser numbers.

37 (81). *D. heroni heroni* Kenr. (1909) (pl. xli, fig. 12 ♀).

Kenrick **116**, p. 177, pl. vi, fig. 3 (Arfak) ♂.

Delias heroni Kenr.; Joicey and Noakes **105**, p. 61, pl. 1, fig. 4 ♀.

♂. Upperside white, with black distal half on the fore wing and a black marginal border on the hind wing. The black area of the fore wing extends into the end of the cell, and sometimes fills the base of cellule 3 and the outer two-thirds of 2, and is 3 mm. or more wide on the inner margin.

Hind wing with black border broad between apex and vein 4 (about 6 mm. wide on vein 6), and thence becoming a heavy line to the inner angle.

Underside of fore wing with smoky-black distal half and white proximal half. The black area extends into the cell-end and into the upper part of the cell to the base, its proximal edge well defined, sharply angled below the origin of vein 4. A deep black post-cellular patch from the costa to vein 4. Three yellow subapical spots in 5, 6, and 8, followed by a small, broken, yellow submarginal line, of which the spot in 4 is more pronounced than the others.

Hind wing bronzy-brown, slightly glossy. A yellow basal costal patch reaching the base of cellule 6, and edged with black on the distal side, the inner margin to a third of the cell, but not as far as vein 2, being also black. A narrow distal marginal border of a deeper black extends from vein 7 to the inner angle, and it bears some slight yellow scaling between the inner angle and vein 4. A rounded, sharply-defined deep black discal patch between veins 3 and 5, slightly entering the cell.

♀. Upperside with proximal areas creamy-white or tinged with yellow. Fore wing black distal area more extended than in the ♂, and its edge less sharply defined. Traces of two or three yellow subapical spots.

Underside as in the ♂, the dark distal area of fore wing a little more extended. Hind wing marginal border wider than in the ♂.

Length of fore wing: ♂ 22—24 mm., ♀ 23—27 mm.

Scent-scale (pl. xxi, fig. 31). Rather long and narrow, with thickened edges, but shorter than in *hypomelas*.

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Genitalia :—

Valve (pl. x, fig. 35). Distal edge with a short process, somewhat pointed, and directed dorsad. Dorsal edge slightly incurved at the middle. Ventral fold moderately developed and broad, with weakly sclerotized proximal edge. Cavity with a large flap.

Uncus (pl. ii, fig. 31). Type of Group 1G. Middle lobe triangular and rather broad, outer lobes short and narrow. Tegumen sharply incurved below the lobes, broadening posteriorly.

Habitat.—North-east Dutch New Guinea: Arfak Mountains. Holotype from Momi, 4,000 feet, November and December. Also taken at the Angi Lakes, 6,000 feet, January to March.

The types are in the Hill Museum.

37 (82). *D. heroni* f. *albo-oculatus* J. and N. (1915) (pl. xli, fig. 13 ♀).

Joicey and Noakes 105, p. 61, pl. vi, fig. 1 (Arfak) ♂ ♀.

This is apparently a dimorphic form of *heroni* from which it does not differ in its scent-scale nor much in its uncus. A certain difference is seen, however, in the valve in which the apical process is shorter and broader, and the ventral fold only slightly developed.

Only differs from the name-typical form in the replacement of the bronzy-coloured area of the hind wing below by silvery-white on which the black discal patch stands out with great distinctness.

Genitalia :—

Valve (pl. x, fig. 36). Distal edge with a short and somewhat triangular process. Dorsal edge nearly straight, posteriorly rounded. Ventral fold slightly developed. Cavity small with large flap.

Uncus. Type of Group 1G. Only differs from *heroni* in the broader and more triangular outer lobes.

Habitat.—North-east Dutch New Guinea: Taken together with *heroni* at the Angi Lakes.

Types in the Hill Museum.

38 (83). **D. ITAMPUTI** Ribbe (1900).

Ribbe 166, p. 330 (Aroa River, 9,000 feet) ♂.

Delias itamputi Ribbe, Sm. and Kirby 203, *Del.* 8, figs. 7, 8 ♂; Rothschild 178, p. 314, pl. ii, figs. 10, 11 ♀; Fruhstorfer 68, p. 129, t. 56f., ♂ ♀.

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The name *itamputi* is from the Malay, meaning the "black and white one."

The species is more nearly allied to *hypomelas* than to *heroni*. It is distinguished from both by the large white costal area on the hind wing below in the ♂, and in the ♀ by the large yellow spots on both sides of the fore wing. It is the only species of this group in which the ♀ does not resemble the ♂. The black hind wing discal patch characteristic of the allied species is absent or vestigial. A possible relationship with the form *albo-oculatus* is seen in some specimens which have a much extended white area on the hind wing below.

The *genitalia* are sufficiently different in structure to indicate more than racial distinction. In the *scent-scale* the affinity with *hypomelas* is manifest, but the shorter and broader scale of *itamputi* is sufficiently characteristic.

♂. Upperside as in *hypomelas* without the paler distal scent-area of the *heroni* fore wing. Fore wing with black distal area slightly less broad than in *hypomelas*, and on the hind wing the black edging is more of a line.

Underside with smoky-black ground-colour. Fore wing similar to *heroni*, but there is less black at base of cell, and the edge of the black area is only slightly angled at vein 4, and the black post-cellular patch is absent or vestigial. Two or three yellow subapical spots as in the allied species but larger and placed farther from the margin. There is usually a white post-cellular mark of variable size beyond the upper end of cell.

Hind wing with a small yellow basal costal spot. A silvery white patch occupies the greater part of the costa and reaches to vein 6 or below it. This patch is sometimes extended to below the cell and into the end of the cell, leaving a black discal patch, or the black patch may be large and leave only some white markings below the cell connected by a line through the cell to the costal patch. In some cases the costal patch suffers a distal reduction. A white submarginal line as in *hypomelas*, sometimes vestigial posteriorly, in other cases very pronounced with a large spot in 6. No distinct black discal spot.

♀. Upperside black with yellow markings. Fore wing with greenish-yellow proximal area extended to vein 3, its edge not sharply defined A subapical row of four chrome-yellow patches, often also a subcostal streak and a fifth spot in 2. The patches in 4 and 5 are larger than the others.

Hind wing with proximal three-fourths of costa white, and a

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proximal greenish-yellow area (paler on the inner margin) extending to the end of the cell, its edge diffuse. Usually two yellow submarginal dots in 5 and 6.

Underside black. Fore wing with yellow subapical patches as above but much enlarged, forming a band of 5 or 6 patches, sharply defined on its outer edge. Proximal area reduced with two-thirds of the inner margin white.

Hind wing with yellow basal spot and submarginal white line as in the ♂. A white subbasal costal stripe on vein 8, and the proximal half of vein 7 white. Sometimes a small yellow discal spot.

Length of fore wing: ♂ ♀ *circ.* 25 mm.

Scent-scale (pl. xxi, fig. 32). Comparatively short and broad, about four times as long as it is broad at the base, thus resembling *hypomelas*, but is a little shorter than that species and narrower anteriorly.

Genitalia:—

Valve (pl. x, fig. 37). Distal edge with a pointed triangular process and a proximal excavation. Dorsal edge incurved at the middle. Ventral fold moderately broad with weakly sclerotized proximal edge Cavity with a large flap. The apical process is longer and the ventral fold less well developed than in *hypomelas*.

Uncus (pl. ii, fig. 32). Type of Group 1G. Middle lobe triangular and rather broad, its apex narrowed and curved inward. Outer lobes very short and narrow. Tegumen incurved and slightly broadening posteriorly. The differences between this and the uncus of *hypomelas* are clearly shown by the figures.

Habitat.—South-west British New Guinea: Aroa River. A series was obtained by A. S. Meek at Owgarra in February, April and May. Also in the Tring Museum from the Angabunga River, 6,000 feet, November—February. North British New Guinea: From Biagi, 5,000 feet, January—May, in the Tring Museum.

The types are in the Tring Museum.

39 (83). **D. NIGROPUNCTATA** J. and N. (1915) (pl. xli, fig. 14).

Joicey and Noakes 105, p. 59, pl. iv (Arfak Mountains) ♂.

This species is distinguished from all others of the group by a submarginal row of small *black* spots on the hind wing below. As the original description is somewhat inaccurate we give a redescription here.

♂. Upperside resembles *heroni*. Fore wing black distal area slightly less extended in cellule 3. Hind wing black marginal border anteriorly

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narrower than in *heroni* (about 4 mm. wide on vein 6), and reaching vein 3 or just below it, edged by a black dusting which is heavier between vein 3 and the inner angle.

Underside with bronze ground-colour as in *heroni*. Fore wing with the inner margin white and a white proximal area extending to vein 4 but not to the end of cell, and filling the lower half of cell, its edge from the inner margin to vein 4 sharply defined. On the left wing of the allotype the white area reaches the upper margin of the cell and is here dusted with black. Five small subapical spots, the ones in 6 placed more proximal than the others, and the anterior one much the larger. Fringe black.

Hind wing with a small yellow basal costal spot edged broadly with white distally, the remainder of the costa lightly scaled with white. A submarginal row of six small black spots not placed near the margin. A small black discal patch in cellule 4 close to the cell, one in the middle of the cell, a smaller one in the base of cellule 2, and some black dusting over the inner marginal area. Fringe black broken by white between the veins.

Length of fore wing: 26 mm.

Scent-scale (pl. xxi, fig. 33). Much resembles *heroni*, less narrowly prolonged anteriorly.

Genitalia:—

Valve (pl. x, fig. 38). Distal edge with a narrow and moderately long process and a proximal excavation. Dorsal edge nearly straight, excurved posteriorly. Ventral fold strongly developed posteriorly and proximally produced to a triangular process. Cavity small. This valve is more like *heroni* than the other related species.

Uncus (pl. ii, fig. 33). Type of Group 1G. Middle lobe broad and triangular, its apex narrowed and slightly curved inward. Outer lobes rather small. Tegumen sharply excurved anteriorly forming a shoulder. A broad type.

Habitat.—North-east Dutch New Guinea: Arfak Mountains. Discovered by the collectors Pratt at the Angi Lakes, 6,000 feet, March 1914. A ♂ was also taken at Warmasin, 6,000 feet, in March.

♀ Unknown. Holotype and allotype in the Hill Museum.

40 (85). **D. THOMPSONI** J. and T. (1916) (pl. xli, fig. 15 ♀).

Joicey and Talbot, *Ann. Mag. Nat. Hist.* (8) xvii, p. 71, pl. v, fig. 3 ♂, 4 ♀ (1916) (Wandammen Mountains).

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This species is distinguished from any other by the two red subbasal spots on the hind wing below. Its affinity with the species already dealt with in this group is shown by the yellow basal costal spot and white submarginal line on the hind wing. Also one finds a very similar kind of scent-scale, and a valve and uncus of the *hypomelas* type.

♂. Upperside as in *heroni*, the black area on the fore wing broader on the inner margin. Hind wing with the marginal border below vein 4 more heavy than in *heroni*.

Underside black. Fore wing with inner margin white for the proximal two-thirds. Three small subapical spots brick-red, with traces of a thin white or reddish line between veins 5 and 3.

Hind wing with a small yellow basal costal spot, a small brick-red subbasal spot in 6, and a similar spot below it in the cell. A well-marked white submarginal line broken at the veins and bearing in cellule 6 a brick-red spot which usually extends into 7. This may be a vestige of the red submarginal line which begins to appear in species-group vii, and occurs also in ix and x, but it indicates a more obvious relation with *rubrostriata*.

♀. Upperside with broad black areas as in *heroni*. Fore wing with more sharply-defined edge of the white area; the white extends into cellule 3 and is less yellow-tinged than in *heroni*. Two short brick-red subapical streaks, the upper one the larger. Hind wing as in *heroni*, the inner area tinged with yellow.

Underside as in the ♂. Fore wing with more heavily marked subapical spots, and more distinct submarginal line which almost reaches the submedian. Hind wing with a short white subcostal stripe above vein 7, and proximally of this the costa is sometimes edged with white as far as the red spot, further indications of affinity with *hypomelas*, etc. The submarginal line is slightly marked with red between the veins.

Length of fore wing: ♂ ♀ 24—26 mm.

Scent-scale (pl. xxi, fig. 34). Resembles *hypomelas* but is shorter and less narrowly prolonged anteriorly.

Genitalia:—

Valve (pl. x, fig. 39). Distal edge with a moderately long triangular process and a proximal excavation. Dorsal edge incurved, excurved posteriorly. Cavity small.

Uncus (pl. ii, fig. 34). Type of Group 1G. Middle lobe broad and triangular, its apex narrowed and slightly curved inward. Outer lobes shorter, separated from the middle lobe. Tegumen incurved anteriorly and sharply excurved posteriorly.

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Habitat.—North-east Dutch New Guinea: Wandammen Mountains; discovered by the collectors Pratt at 6,000 feet in November. A small series of both sexes was obtained.

Types in the Hill Museum.

41 (86). **D. CITRONA** J. and T. (1922).

Delias cuningputi citrona Joicey and Talbot **108**, p. 307 (Weyland Mountains) ♂ ; **110**, pl. vii, fig. 1.

This insect, of which only the unique type is known, had unfortunately lost its abdomen, so no details of genitalia can be given. According to its pattern it should be a race of *cuningputi* Ribbe, but we prefer to keep it distinct for the present. It commences a series of banded hind-wing species to which probably *imitator* should belong. It is distinguished by the same proximal area of the fore wing being *yellow*, and by the yellow hind wing with black border.

♂. Upperside of fore wing with basal area as in *fascelis* but citron-yellow. Two subapical yellow dots. Hind wing citron-yellow, with black outer border of similar width and shape to *fascelis*.

Underside of fore wing as in *fascelis*, but the subapical spots orange-yellow, with discal dusting yellowish and more extended. Hind wing much as in *fascelis*. The postdiscal band is much broader both in its yellow and white portions. Submarginal spots orange-yellow. Cellules 2 and 3 with yellow dusting between the band and the submarginal spots, no yellow spot in cellule 6.

Scent-Scale. Very similar to *cuningputi*, but the thickened edge is more extended anteriorly.

Habitat.—North Dutch New Guinea: Weyland Mountains; a single ♂ discovered by the collectors Pratt in the Menoo Valley, 3,500—5,000 feet, December—January.

Type in the Hill Museum.

42. **D. CUNINGPUTI** Ribbe.

This species is distinguished by the band on the hind wing below being white at least anteriorly, and not marked in the ♂ with yellow bars above vein 2.

Three races are known, neither one being common. The females are rare. It is found in the Arfak Mountains, on Mount Goliath, and in the Aroa River District.

The *scent-scale* is long and tapering, with rather thickened edge for two-thirds of its length.

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The *valve* is similar to the species *imitator* and others following, and has no sharply-cut proximal excavation.

The *uncus* is narrower and perhaps more resembles *itamputi*.

Length of fore wing: ♂ 24—26 mm., ♀ 24—28 mm.

42 (87). *D. cuningputi jordani* Kenr. (1909) (pl. lv, fig. 4 ♀).

Delias jordani Kenrick **116**, p. 181, pl. vii, fig. 7, ♂ (Arfak Mountains); Joicey and Noakes **105**, p. 62, pl. vi, fig. 7 ♀.

This race is distinguished by the large white proximal area on the fore wing below.

♂. Upperside as in *heroni* and *thompsoni*, the fore wing with the white area more extended in cellule 3. Hind wing with the black marginal border more uniformly wider than in *thompsoni* but narrowing below vein 4, and sharply defined.

Underside of fore wing brownish-black with proximal white area as in *heroni* but not reaching the tornus and usually excurved at vein 4, though sometimes angled at this vein as in *heroni*. Five small grey-white subapical spots, the two anterior ones usually tinged with yellow and placed a little more proximad. Sometimes a small white subcostal spot near the base of vein 6.

Hind wing with fuscous-brown ground-colour and a white postdiscal band which is constricted and sometimes broken in cellule 4. This band does not enter the cell, its inner edge is sharply defined and strongly incurved at the middle, its outer edge strongly scalloped. Anteriorly the band expands on the costa which is white and bears a small yellow basal spot. There is a small yellow subbasal spot in 7 on the edge of the white area, and beyond it the ground-colour forms a short invading bar in the white area. In the cell near the base of cellule 5 is a somewhat oblong yellow spot with a distal white edging; this is sometimes joined to the band. Slight yellow scaling on the inner edge of the band in cellule 2 and in the submedian area, and also between the lower edge of the band below vein 2 and the inner margin. A submarginal row of yellow dots not placed near the margin, the anal one with a thin yellow prolongation to the margin, and those in 2 and 3 with a similar but white prolongation.

Fringe of fore wing black, dotted with white at the folds, of the hind wing white mixed with black, nearly black at the veins.

♀. Upperside resembles the ♂, but is creamy-white with broader black areas. Three or four small subapical spots, not very distinct.

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Underside as in the ♂. Fore wing with slightly more extended white area especially in the cell. Hind wing with yellow markings more orange. Postdiscal band broader in the middle, and marked in cellule 2 by a yellow bar. Submarginal spot in 4 also with a thin white prolongation.

Scent-scale (plate xxii, fig. 36). Long and tapering, with thickened edges for two-thirds of its length.

Genitalia:—

Valve (pl. x, fig. 40). Distal edge with a moderately long process anteriorly narrow, proximally strongly incurved. Dorsal edge slightly rounded along the middle, and more excurved posteriorly. Ventral fold weakly developed. Cavity small with large flap.

Uncus. Type of Group 1G, and similar to *fascelis* but with shorter lobes.

Habitat.—North-east Dutch New Guinea: Arfak Mountains. Type from Momi, 4,000 feet, November and December. Also taken at Warmasin, 6,000 feet, March; Angi Lakes, 6,000 feet, March. Discovered by the collectors Pratt who took a moderate series with some females. Holotype in the British Museum. Neallotype ♀ in the Hill Museum.

42 (88). *D. cuningputi fascelis* Jord. (1911) (plate xli, fig. 16, ♀).

Delias fascelis Jordan **114**, p. 587 (Mount Goliath) ♂ ♀.

Distinguished from other races by the band of the hind wing being almost straight and much marked with yellow below vein 4.

(Original description).

"♂ ♀. Speciei *D. cuningputi* Ribbe (1900) dictae similis.—♂ alis anticis supra a basi ad ramum primum medianum albis, plus dimidio exteriore nigro; subtus nigris, postice parum albo suffusis. Alis posticis subtus fascia media albo flavo maculata ante medium fere interrupta postice latiore quam antice.—♀ alis anticis supra et infra macula magna a margine postico ad cellulam extensa parum diffusa alba paullulo flavescente. Alis posticis supra albis minime flavescentibus fascia limbali nigra postice gradatim attenuata; subtus fascia alba ut in ♂ marginem analem attingente postice plus minusve flavo suffusa.

"This species represents in the Snow Mountains *D. cuningputi* Ribbe (1900) from British New Guinea and *D. juliginosus* Kenr. (1909)

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from the Arfak Mountains. It is easily distinguished in both sexes by the fore wing.

" ♂. The basal area of the fore wing, above, has the peculiar greyish tone of *D. cuningputi* but reaches only to the point of origin of M^1, more than half the wing being black. The black costal border (as in *cuningputi*) does not invade the cell. There are several exceedingly small white subapical dots, and occasionally also feeble traces of dots at the ends of some veins. The black border of the hind wing is more sharply defined than in *cuningputi;* measures nearly 10 mm. in front and narrows to a point posteriorly. The white marginal spots are smaller than in *cuningputi.*

"The underside resembles that of *cuningputi*, but the spots are deeper yellow; the one or two small spots placed distally from the cell of the fore wing are yellow. The median band of the hind wing is anteriorly narrower than in *cuningputi* and posteriorly broader, and is so suffused with black in front of the apex of the cell as to be nearly interrupted; the yellow spots are smaller, the submarginal ones being very thin transverse bars; and the ground-colour has a distinct purple tone.

" ♀. The upperside of the fore wing is black for the greater part. The white area, which has a yellowish tone, is so much suffused with black proximally that it is reduced to a triangular patch extending from the hind margin to the cell and hardly reaching vein M^1; the black outer border measures 4—5 mm. at SM^2; in some specimens the white patch is shaded all over with black and is more distinctly yellow. There is a subapical curved row of four pale yellow dots. The hind wing has also a slight yellow tone. The black border gradually narrows to a point as in the ♂; it is, however, as a rule narrower anteriorly than in that sex.

" The white area of the fore wing beneath is less suffused with black than above and is a little larger, there being also a spot in the cell; there is a small yellowish subcostal dot beyond the cell and a subapical row of five yellow spots, the margin moreover bearing some minute white dots. The hind wing resembles that of the ♂ in the yellow spots being smaller than *cuningputi* and the median band reaching to the anal margin. The hind portion of this band is in ♂ and ♀ more distal than in *cuningputi.* However, the band differs in some ♀ ♀ from that of the ♂ in being essentially broader, posteriorly much shaded with yellow, and not interrupted in front of the apex of the cell."

Scent-scale (pl. xxii, fig. 37). Resembles *jordani* in all respects, but may be of a denser texture.

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Genitalia :—

Valve (pl. x, fig. 41). Distal edge with a moderately long process curved dorsad. Dorsal edge slightly excurved at the middle and well rounded posteriorly. Ventral fold strongly developed posteriorly with a well sclerotized proximal edge. Cavity small with a large flap.

Uncus (pl. ii, fig. 35). Type of Group 1G. Middle lobe triangular, broad and long, its apex curved slightly inward, tegumen obliquely incurved anteriorly. A narrow type.

Habitat.—South Dutch New Guinea: Mount Goliath, 5,000—7,000 feet, January and February. Also taken in the Snow Mountains, 3,500 feet, October—December. Discovered by A. S. Meek. Types from Mount Goliath, in the Tring Museum.

42 (89). *D. cuningputi cuningputi* Ribbe (1900).

Pieris cuningputi Ribbe **166**, p. 308 (Aroa River) ♂.

Delias cuningputi Ribbe; Smith and Kirby **203**, p. 30, *Del.* viii, figs. 9, 10 ♂; Rothschild **178**, p. 313, pl. xi, figs. 5, 6 ♀; Fruhstorfer **68**, p. 129, t. 56e.

Distinguished from *jordani* in the ♂ by the uniformly narrower white band on the hind wing, and by the subcostal yellow spot being free. In the ♀ by the orange proximal area of fore wing below.

♂. Upperside as in *jordani* but with broader black border on the hind wing.

Underside of fore wing black; below vein 2 the inner marginal area is grey-white for the proximal three-fourths, above which a proximal shade represents the white area of the upperside. Five small subapical spots, placed nearer the margin than in *jordani*, and yellowish-white, the two anterior ones being more distinctly yellow; the area beyond them is earth-brown.

Hind wing similar to *jordani*. The white band is similarly curved, not constricted but narrower, and with less strongly scalloped edge. Costa not white except at the band; subcostal spot free; submarginal spots larger than in *jordani* with yellow and white dusted prolongations to the margin.

♀. Upperside as in *jordani*. Fore wing with edge of white area more rounded; hind wing with broader marginal black which is sharply angled at vein 5.

Underside of fore wing with orange proximal area and subapical

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spots, the inner margin white. An orange subcostal spot near the base of vein 6, and sometimes one or two below it.

Hind wing similar to the ♂ but white band abbreviated, broader, only reaching vein 3 where there is a yellow spot near the cell; the band is marked by a yellow bar in each cellule. Submarginal spots as in *jordani*, therefore smaller than in the ♂.

A yellow-coloured ♀ is in the Tring Museum from the Angabunga River.

Scent-scale (pl. xxi, fig. 35). We have figured a magnified (x 900) part of this scale, which illustrates the texture and thickened edge characteristic of the species as a whole. As no dissection was made of this insect we have no details of genitalia available.

Habitat.—South-west British New Guinea: Aroa River, April and May, chiefly taken at Owgarra. Also found on the Angabunga River, 6,000 feet, November—February. Rarer than the other races.

Types in the Tring Museum from the Aroa River.

33. **D. PHERES** Jord.

D. pheres and *D. aroae* are two difficult species because of their close resemblance to one another. They occur flying together and it is easier to separate two such races occurring together than to separate the two species as a whole.

In *pheres* the black area on the fore wing reaches the cross-veins, and it does so in some of the typical *aroae*. On the underside the black invades the cell to a greater extent in *pheres* than in *aroae*. Both species have two similar forms of the female. Both species are distinguished from *cuningputi* by the strongly-developed sulphur-yellow markings on the hind wing below.

Length of fore wing: ♂ 24—26 mm., ♀ 23—27 mm.

The *scent scale* is typical of the group. In *pheres* it is longer and broader than in *aroae*.

The *valve* is typical of the group. In *pheres* the dorsal excavation is not so deep as in *aroae*, and the ventral fold is more strongly developed.

The *uncus* more easily characterizes the two species. In *aroae* the outer lobes are longer and the middle lobe shorter than in *pheres*.

Four races of *pheres* are known from British and South Dutch New Guinea. The species was not found in the Arfak.

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43 (90). *D. pheres pheres* Jord. (1911) (pl. xlii, fig. 1 ♂).

Delias aroae pheres Jord. **114**, p. 588 (Mount Goliath) ♂ ♀.

This race is distinguished by the cell of the fore wing being black below for the greater part.

♂. Upperside purer white than in *cuningputi*, black area of fore wing enters the end of the cell. Hind wing with narrow black marginal border which below vein 4 is formed of spots of decreasing size on the veins.

Underside with brownish-black ground-colour. Fore wing with white proximal area extending into the lower outer part of cell and base of cellule 3. Four small yellow subapical spots and two smaller ones near the margin in 2 and 3.

Hind wing pattern as in *cuningputi cuningputi*, but the band marked with wider yellow bars and its outer edge more scalloped. The cell-spot is larger and so are the submarginal spots. There is strong yellow dusting below the cell and on the inner margin.

♀. Upperside as in the ♂ but creamy-white. Fore wing with 3 or 4 yellowish subapical dots. Hind wing with heavier dark border which posteriorly is not quite broken up.

Underside as in the ♂, the band of the hind wing wider.

Scent-scale (see *approximata*).

Genitalia:—

Valve (pl. x, fig. 42). Distal edge with a short finger-like process and a deep proximal excavation. Dorsal edge slightly incurved, strongly rounded posteriorly. Cavity not seen.

Uncus (pl. ii, fig. 36). Type of Group 1G. Middle lobe short and broad, the apex slightly incurved. Outer lobes small and directed inward. Tegumen sharply incurved anteriorly, becoming rather broad posteriorly.

Lamina dentata (see *approximata*.)

Habitat.—South Dutch New Guinea: Mount Goliath 5,000—7,000 feet, January and February. Discovered by A. S. Meek who took a good series.

Types in the Tring Museum.

43 (91). *D. pheres approximata* J. and T. (1922).

Joicey and Talbot **108**, p. 309 (Weyland Moutains) ♂ ♀; **110**, pl. viii, figs. 5, ♂, 6 ♀.

This race is distinguished by the more extended white in the cell of

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the fore wing below, but is otherwise very like the typical form. The uncus is different, not usual in races.

♂. Upperside as in *pheres pheres*. Underside of fore wing with the white area extended into the lower part of cell from below vein 2 to almost the cross-veins, more extended in cellule 3 and to near the tornus. Hind wing as in typical form.

♀. Upperside as in *pheres pheres* but with reduced dark basal area on the fore wing. Some specimens tinged with yellow on the fore wing and some are milky-white with a gloss.

Underside as in the ♂, but band of hind wing wider and more white.

A second form of ♀ is dealt with hereafter.

Scent-scale (pl. xxii, fig. 38). Long and narrow with thickened edges.

Gentalia:—

Valve as in the typical form.

Uncus (pl. ii, fig. 37). Type of Group 1G. Middle lobe rather broad and triangular, its apex shortly curved inward. Outer lobes very small and directed outwards. Tegumen incurved anteriorly, becoming very broad posteriorly.

Lamina dentata (pl. vi, fig. 21). Long and narrow, distal ends rounded. The unarmed area of the anterior margin is about half the length of the lamina and is incurved, of the posterior margin a little shorter and nearly straight. Teeth strong but few on the margins, a broad unarmed middle area.

Length = *circ.* 1 mm., breadth = *circ.* 0·16 mm.

Habitat.—North Dutch New Guinea: Weyland Mountains, Menoo River, 3,500—5,000 feet, November—January; Mount Kunupi, 6,000 feet, November—January. Discovered by the collectors Pratt who obtained a good series of ♂ ♂ and a small series of ♀ ♀.

Types in the Hill Museum.

43 (92). *D. pheres approximata* ♀ f. *rectimargo* J. and T. (1922).

Joicey and Talbot 109, p. 309; 110, pl. viii, fig. 7.

Differs from the typical female in the uniformly broad and sharply-defined black margin of the hind wing extending from the costa to the inner angle. On the hind wing below the submarginal spot below vein 2 is vestigial.

The type and another from Mount Kunupi, and one from Menoo River, with the typical form.

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43 (93). *D. pheres hyperapproximata* Roths. (1925).

Rothschild **182**, p. 675 (Rawlinson Mountains) ♂ ♀.

Distinguished by the yellow proximal area of the fore wing below, in which however it agrees with *angabungana*.

(Original description).

"All the forms of *pheres* show little difference on the upperside, with the exception that in *pheres pheres* a considerable proportion of the ♀ ♀ are suffused strongly with buff.

"♂ ♀. Below differ at first sight from *ph. pheres* and *ph. approximata* having the basal pale area yellow, *not* white; on the hind wing the yellow patches are smaller, and the extreme forms of the ♀ have a white disc without any yellow patches."

Habitat.—North British New Guinea: Rawlinson Mountains, described from eight ♂ ♂, four ♀ ♀. Also occurs in the Cromwell Mountains.

Types in the Tring Museum.

43 (94). *D. pheres angabungana* Talb. (1928).

Talbot **222**, p. 42 (Angabunga River) ♂.

(Original description).

"♂. Hind wing above with the marginal border a little broader than in the allied *hyperapproximata* Roths., especially the two posterior spots. Fore wing below with the submarginal spots a little larger. Hind wing below with submarginal spots in 4 and 5 larger, subbasal spot in 7 larger, base of costa, a spot at base of cell, and basal submedian stripe orange instead of yellow."

Habitat.—South-west British New Guinea: Angabunga River, 6,000 feet upwards, November, 1904, to February, 1905, one ♂ taken by A. S. Meek. Type in Museum Tring.

44. **D. AROAE** Ribbe.

This species is closely allied to *pheres*, and in dealing with that species we have indicated the points by which *aroae* may be distinguished. The female exists in two forms exactly as in *pheres*.

The size of the species is the same as in *pheres*.

Three races are known from the Arfak, Weyland Mountains, and British New Guinea. It occurs together with *pheres* in the Weyland Mountains, and ought to be found in the area of the Rawlinson Mountains.

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44 (95). *D. aroae yabensis* J. and T. (1922).

Joicey and Talbot **108**, p. 308 (Weyland Mountains), ♂ ♀ ; **110**, pl. vii, figs. 8 ♂, 9 ♀.

(Original description).

"Distinguished from *aroae* from British New Guinea and the Arfak Mountains by reduced black apical area on the fore wing and broader yellow band on the hind wing below.

"♂. Upperside of fore wing with distal black narrower, especially in cellules 4 and 5. Hind wing with reduced marginal black.

"Underside of fore wing with the white area continued from veins 4 to 9, and the costal black forming a triangular patch over the upper angle of the cell. The white spots beyond the cell vary in size and are rarely absent as in the typical form. Subapical spots as in the type form. Hind wing with broader yellow discal band, larger cell spots and larger marginal spots.

"♀, There are two forms. The typical form is similar to the known ♀ of *aroae*. Upperside of the fore wing with a black discocellular mark and the white area extending more or less into cellules 4 and 5. Hind wing as in the typical form. Underside as in the ♂, the discal band of hind wing with white ground-colour as in type form."

Scent-scale (pl. xxii, fig. 39). Shorter and narrower than in *pheres*.

Genitalia :—

Valve (see *angiensis*).

Uncus (see *aroae*).

Lamina dentata (pl. vi, fig. 20). Distinguished from *pheres* by the broader lobes and increased armature. Long and moderately narrow, distal ends rounded. The unarmed middle of anterior margin slightly excurved, and of the posterior margin sharply excurved. Teeth strongly developed.
Length = *circ.* 1 mm., breadth = *circ.* 0·2 mm.

Habitat.—North Dutch New Guinea: Weyland Mountains, Menoo River, 3,500—5,000 feet, November—January; Mount Kunupi, 6,000 feet, November—December; Djalan River, May and June. Discovered by the collectors Pratt who obtained a long series of ♂ ♂ and a small series of ♀ ♀.

Types in Hill Museum.

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44 (96). *D. aroae yabensis* ♀ f. *brevifascia*, J. and T. (1922).

Joicey and Talbot **108**, p. 308 ; **110**, pl. viii, fig. 10.

Resembles *rectimargo*. Fore wing above as in ♀ *yabensis*. Hind wing as in *rectimargo* with narrower black border. Underside of fore wing as in *yabensis*. Hind wing with the band abbreviated and vestigial posteriorly.

Occurs together with the typical form. Type from Mount Kunupi, 6,000 feet.

A specimen from the Menoo River is perhaps intermediate. The hind wing above is typical *yabensis* ♀, but below it is like *brevifascia*.

44 (405). *D. aroae angiensis* Talb. (1928).

Talbot **222**, p. 43 (Arfak Mountains), ♂ ♀.

(Original description).

" ♂. Not very different from the typical British New Guinea subspecies, with which it agrees on the upperside.

" Underside of fore wing with the submarginal dots below vein 4 less strongly marked. Hind wing with the cell-spot and submarginal spots smaller.

" ♀ similar to the ♂. Hind wing below with discal band narrower than in *aroae* ♀ and not reaching the inner margin."

Genitalia :—

Valve (pl. x, fig. 43). Distal edge with a moderately long finger-like process, and a rather deep proximal excavation. Dorsal edge nearly straight, posteriorly sharply incurved. Ventral fold strongly developed posteriorly. Cavity small with a large flap.

Habitat.—North-east Dutch New Guinea : Arfak Mountains at the Angi Lakes, 6,000 feet, March, 1914. A series of ♂ ♂ and one ♀ taken by the collectors Pratt.

Types in the Hill Museum.

44 (97). *D. aroae aroae* Ribbe (1900).

Pieris aroae Ribbe **166**, p. 346 (Aroa River) ♂.

Delias aroae Ribbe, Smith and Kirby **203**, p. 33, *Del.* ix, figs. 4, 5 ♂.

" " Rothschild **178**, p. 314, pl. ii, fig. 4 ♀.

" " Fruhstorfer **68**, p. 129.

The typical form of this species more resembles *pheres* than the

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other races of the species on the upperside, but is easily distinguished by the greater extent of white in the cell of the fore wing below.

♂. Upperside similar to *pheres*. Fore wing with the white area more extended in cellule 3 and usually to beyond the end of the cell. Hind wing with black border narrower than in *pheres*.

Underside of fore wing as in *yabensis* but seldom with white marks beyond end of cell. Hind wing with a narrower band than in *yabensis*.

♀. Upperside as in *approximata*. Fore wing below as in the ♂ but the cell is more narrowly bordered with black, the edge of the white area sharply defined. Hind wing with the band rather white and broader than in the ♂.

A second form of ♀ resembles *brevifascia*. There is a specimen of this in the Tring Museum from Biagi, and it is decidedly yellow in colour.

Scent-scale (see *yabensis*).

Genitalia:—

Valve (see *angiensis*).

Uncus (pl. ii, fig. 38). Type of Group 1G. Middle lobe short and broad, narrowed at the apex which is shortly curved inward. Outer lobes small and directed outward. Tegumen incurved anteriorly, broadened posteriorly.

Habitat.—South-west British New Guinea: Owgarra, May; Anabunga, 6,000 feet, November to April; Aroa River. North British New Guinea: Biagi, 5,000 feet, January—April.

Type ♂ from Aroa River, ♀ neallotype from Upper Aroa. Types in Tring Museum.

45 (98). **D. FULIGINOSUS** Kenr. (1909) (pl. xlii, fig. 2 ♀).

Kenrick 116, p. 176, pl. vi, figs. 1, 1a (Arfak Mountains) ♂ ♀.

This species is easily recognized by its upperside colouring of blackish-brown dusted with yellow. It is known only from the Arfak where it was discovered by the collectors Pratt who obtained a series of ♂ ♂ and a few ♀ ♀. The ♀ occurs in two forms, the form like the ♂ being very scarce.

♂. Upperside blackish-brown dusted with yellow, sometimes quite considerably. Fore wing with two subapical yellowish dots, sometimes indistinct; three or four submarginal dots close to the margin, usually forming short marginal streaks. Fringe blackish-brown.

Hind wing more strongly dusted with yellow, the inner margin and

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proximal two-thirds of costa yellowish-white. Short marginal streaks or dots between the veins breaking up a narrow black marginal border defined by the absence of yellow dusting. Fringe yellow between the veins.

In one specimen in the Hill Museum, the yellow dusting is absent and the upperside is grey-black with creamy-white markings.

Underside pattern more nearly approaches *imitator* but the fore wing is without a band, and the band of the hind wing is very narrow. The hind wing pattern is also much like *pheres* and *aroae.*

Fore wing brownish-black, the inner margin sometimes dusted with white. Three small yellow subapical spots, and three smaller submarginal ones with distal prolongation.

Hind wing black with a purplish tinge. A small yellow basal costal spot, between which and the band the costa is narrowly white. A yellow subcostal spot in 7 and a larger one in the cell. Postdiscal band as in the allied species from costa to vein 2, white with a yellow bar in each cellule, outer edge strongly scalloped with longer prolongations on veins 3 and 4. A short yellow stripe below the cell, and a yellow or orange spot terminating the band on the submedian fold. Some yellow inner marginal dusting. Six pale yellow submarginal spots shaped as in *aroae* and *pheres*, the anterior three the smaller, the others prolonged to the margin.

♀. Resembles the ♂, but upperside with only slight yellow dusting. Fore wing dots more distinct. A postdiscal shadowy band which defines a dark patch of ground-colour outside end of cell. Hind wing with a postdiscal shadowy band.

Underside of fore wing with postdiscal yellowish-white dusting indicating a broad band from vein 4 to margin, with slight dusting from vein 4 to subcostal spot. This is interesting as showing some affinity with *imitator.*

Hind wing as in the ♂, the band a little broader and less marked with yellow.

A second ♀ form is dealt with hereafter.

Length of fore wing: ♂ 25—26 mm., ♀ 25 mm.

Scent-scale (pl. xxii, fig. 40). More resembles *imitator* as it does not broaden out at the base, but is shorter than that species with edges less thickened.

Genitalia:—

Valve (pl. x, fig. 44). Distal edge with a moderately long triangular process and proximal excavation. Dorsal edge nearly

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straight, posteriorly shortly rounded. Ventral fold very weak and not defined. Cavity of moderate size.

Uncus (pl. ii, fig. 39). Type of Group 1G. Middle lobe very broad, narrowed at the apex which is curved inward. Outer lobes small and directed inward. Tegumen incurved anteriorly becoming rather broad posteriorly.

This uncus is more like *aroae* and *pheres* than it is *imitator*.

Habitat.—North-east Dutch New Guinea: Arfak Mountains. Type from Momi, 4,000 feet, November and December. Also taken at Warmasin, 6,000 feet, February; Angi Lakes, 6,000 feet, January—March.

Holotype in the British Museum. Allotype ♀ in the Hill Museum.

45 (99). *D. fuliginosus* ♀ f. *ochraceus* J. and N. (1915) (pl. xlii, fig. 3).

Joicey and Noakes 105, p. 59, pl. iv.

The shadowy postdiscal band seen in the typical ♀ (of which we know only one specimen) is here much more distinctly defined by dense ochraceous dusting, especially on the hind wing. The black discoidal spot on the fore wing is rendered more distinct.

Underside of fore wing with a distinct yellowish-white postdiscal area from the inner margin to vein 4, reaching the margin of cell except at the base, and extended to beyond half the distance between cell and outer margin. There is also a large spot in the cell, and the subcostal spot reaches vein 5 and is connected to the band by yellowish dusting. The band is usually sharply defined on its outer edge and diffuse on its inner edge.

Here we have a pattern closely resembling the *imitator* fore wing.

Hind wing as in the typical female.

Taken by the collectors Pratt at the Angi Lakes, 6,000 feet, January—March.

Type and six others in the Hill Museum.

GROUP 6.

A group of homogeneous pattern with one distinct type of scent-scale and one type of uncus.

Four species are known, comprising six races occurring in the mountains of British and Southern Dutch New Guinea. All are rare in collections, though *catisa* was taken in greater numbers.

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The underside pattern of these species bears a curious but superficial resemblance to species of the American genus *Catasticta*. The hind wing in all the known forms bears a large **S**-shaped band crossed longitudinally by an orange or yellow stripe. There is a prominent orange or yellow spot below the cell and large white submarginal spots marked with orange or yellow bars or dots, sometimes forming streaks from the proximal edge of the submarginal spots to the margin.

Key to the Species.

1. Fore wing below with a large orange area 2
   Fore wing below with a large white or yellow area 3
2. Hind wing below with the distal edge of discal band not indented ... ... *eichhorni*
   Hind wing below with distal edge of discal band much indented *carstenziana*
3. Fore wing below with two large creamy-white submarginal spots in cellules 2 and 3, and one at the tornus ... ... *leucobalia*
   Fore wing below without large spots in the marginal area ... *catisa*

46. D. EICHHORNI Roths.

This species may be recognized by the orange area of the fore wing below extending well beyond the cell. Two races are known.

46 (100). *D. eichhorni eichhorni* Roths. (1904).

Rothschild 178, p. 316, pl. xi, figs. 15, 16 ♂, 17 ♀ (Owgarra). (Original description).

"♂. Wings, upperside: Fore wing black, a large white triangular area from hinder margin forwards to R^3, penetrating into the cell, truncate-sinuate costally, not extending to base; three white spots beyond apex of cell from costal margin to R^3, more or less confluent, the first the smallest; two small white subapical spots. Hind wing for the greater part white; a somewhat irregular distal marginal band black, tapering behind.

"Underside: Fore wing black, a large deep cadmium-yellow area as shown in figures, deeply excised at the cross-veins; a row of five white submarginal spots, slightly tinged with citron-yellow, second the largest, fourth the smallest. Hind wing olive black; a white band somewhat shaped like figure 3 obliquely from base of costal margin to disc, streaked or spotted with yellow between the veins, a submarginal row of large white spots, mostly nailhead-shaped, being produced to the distal edge, except the first; these also marked with yellow mesially; a

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yellow spot between end of band and SM^2; this vein citron-yellow; abdominal margin more or less white in middle.

"♀. Differs from ♂ on the *upperside* in the fore wing being more extended black and having the spots sulphur-yellow, in the hind wing being shaded with sulphur-yellow, and having a broader black border, which includes vestigial sulphurous spots; and on the *underside* in the fore wing bearing a series of seven submarginal spots."

Length of fore wing: ♂ ♀ *circ.* 24 mm.

Habitat.—South-west British New Guinea; Owgarra, north of head of Aroa River. Discovered by A. S. Meek in May, 1903. Only a few specimens known. Types in Tring Museum.

46 (101). *D. eichhorni frater* Jord. (1911) (pl. xlii, fig. 4).

Jordan **114**, p. 585 (Mount Goliath).

(Original description).

"♂ ♀. A subsp. *eichh. eichhorni* dicta alis anticis subtus macula nigra discocellulari plus duplo angustiore facile distinguenda.

The white area on the upper surface of the fore wing is smaller and more diffuse at the edges than in *D. e. eichhorni*, and in one of the ♂ ♂ so much suffused with black as to be almost entirely suppressed.

The black discocellular bar of the underside of the fore wing measures only 1 mm. or less in width, and is angulate, being sometimes almost interrupted before R^2 (vein 5)."

Scent-scale (pl. xxii, figs. 41, 42). Long and of moderate width with small disc. Edges thickened posteriorly to less than half the length. Central core restricted to the base. The structure of the posterior part of the scale is well shown on fig. 41 on a greatly magnified scale.

Genitalia:—

Valve (pl. x, fig. 45). Distal edge with a long finger-like process only slightly narrowing anteriorly. Dorsal edge deeply incurved, posteriorly slightly incurved. Ventral fold posteriorly broad with defined proximal edge. Cavity small with a large flap.

Uncus (pl. ii, fig. 40) Type of Group 1A. Lobes small and equal. Tegumen slightly incurved, broadening posteriorly.

Habitat.—South Dutch New Guinea: Mount Goliath, 5,000—7,000 feet, January and February. Discovered by A. S. Meek.

Types in Tring Museum.

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47 (102). **D. CARSTENZIANA** Roths. (1915) (pl. lv, fig. 3).

Rothschild **181**, p. 8, pl. i, fig. 14 (Snow Mountains).

This species is distinguished by the orange area of the fore wing below being restricted to the proximal half of the wings.

(Original description).

" ♂. Nearest to *catisa* Jord. in pattern, and in shape and size to *leucobalia* Jord.

" Upperside: Fore wing brownish-black, an oval creamy-white patch occupying lower two-thirds of cell, a postmedian oblique band of 3 cream-white spots and a similar subapical spot, subbasal half of wing below cell cream-white, base of wing brown-black powdered with grey scales. Hind wing, base brown black, with grey scales, subbasal three-quarters of wing cream-white, abdominal fold golden yellow, white spots on termen at end of veins in both wings.

" Underside: Fore wing, basal half obliquely, except costa, bright orange; outer half brown-black, a postmedian strongly oblique band of 3 large spots yellow, 2 subapical spots white with orange streaks; the terminal white spots run inwards along the veins some 2 millimetres, their inner half being orange. Hind wing deep black-brown, basal one-third of costa broadly white edged with orange, an irregular jagged white patch very wide reaches from costa one-sixth from base obliquely across the wing to beyond the cell between veins 3 and 7, this patch is edged with orange; 2 orange spots below cell and 2 orange lines from base to tornus along abdominal fold, a submarginal band of large helmet-shaped white spots and a marginal row of pale yellow spots, veins beyond cell orange. One specimen has the cell on fore wing above entirely white and the median spot of oblique band much enlarged and joined to white area of cell; another above has the postmedian spots almost obsolete and ground-colour intense black.

" Expanse 60 mm. Length of fore wing 28 mm."

♀ unknown.

Scent-Scale (pl. xxiii, fig. 43). Very similar to *eichhorni*. The central cloudy core more extended.

Genitalia:—

Valve (pl. x, fig. 46). Distal edge produced to a short straight process which is beset with short bristles at the apex. Dorsal edge straight, but posteriorly with a strong rounded prominence. Ventral fold broad posteriorly with a weak proximal edge. Cavity small and elongate. A much larger valve than others of the group.

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Uncus (pl. ii, fig. 41). Type of Group 1A. Lobes small, short and equal. Tegumen incurved and broadening posteriorly. A long narrow type.

Habitat.—South Dutch New Guinea: Snow Mountains, Carstenz Peak, 5,000—10,000 feet, February, 1913. Discovered by Dr. Wollaston on the expedition made by the B.O.U. to the Snow Mountains. Only nine ♂ ♂ known.

Types in Tring Museum.

48. **D. LEUCOBALIA** Jord.

This species is distinguished from others of the group by the presence on the fore wing below of three large white spots near the lower outer margin. The uncus and scent-scale more nearly resemble the preceding species than those of *catisa*, but the valve, whilst showing some resemblance to that of *catisa*, is distinctive.

48 (103). *D. leucobalia leucobalia* Jord. (1911).

Jordan **114**, p. 585 (Mount Groome).

(Original description).

" ♂ ♀. Alis anticis supra nigris extus albo maculatis, dimidio basali in ♀ albo dense nigro suffuso. Posticis albis, late nigro marginatis serie macularum albarum ornatis. Subtus anticis a basi fere ad apicem cellulae albis, in ♂ nigro suffusis, extus duabus seriebus macularum albarum. Posticis ut in specie *D. eichhorni* dicta ornatis, maculis flavis saturatioribus.

" A long-winged species, which is larger than *D. eichhorni* Roths. (1904), and differs also much in the pattern of the fore wing.

" ♂. The upperside of the fore wing is entirely black, with a slight white suffusion in the basal half, the greater part of the median vein and the bases of its two branches are white; beyond the apex of the cell there is a rounded spot at the costal margin, followed by a short streak upon R^2, the row being continued by three larger submarginal spots; between this row and the apex there is a nearly straight series of four white spots, all these spots being more or less diffuse at their edges. The outer margin bears three minute white dots. The hind wing is white with a faint yellowish tone, and has a small diffuse, blackish central patch at the base. The black outer border bears a row of four white spots, of which the second is the most prominent one, the others being more or less shaded with black; the black band reaches

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to M^2, almost gradually narrowing posteriorly, and being widest along R^1, where it measures 9–10 mm. in breadth; its inner edge is rounded-elbowed between R^1 and R^2 owing to the elongate shape of the wing. The outer margin of the wing is distinctly incurved between the veins, where the fringes are white.

"On the underside the basal half of the fore wing is white shaded with black, the white scaling being densest at the hindmargin and distally in and below the cell; the area does not reach the apex of the cell, stopping about 1 mm. short of it, and its outer edge crossing M^1 about 4 mm. from the cell, the area being obtusely angulate at this vein. From the first subcostal to the inner angle there is a curved row of six spots, the first being small and yellowish, the second and third large, white, and confluent, and the other three also white, large, round, and isolated, the last being the largest of all. Between this row and the apex the wing bears a slightly curved row of four small spots of equal size, of which the first is orange, the others being white. The markings of the hind wing agree with those of *D. eichhorni* Roths. (*Nov. Zool.*, xi, p. 316, tab. ii, figs. 15, 16, 17, 1904), but the spots are a deeper orange, and the submarginal ones stand farther away from the edge.

"♀. Similar to the ♂, slightly smaller. Fore wing, on the upperside, with the white area of the underside reproduced, but much shaded with black, the white scaling being most distinct between M^1 and M^2; the second and third spots of the inner row, placed in front of and behind R^2, are distinct and confluent, being larger than the other spots. The inner edge of the border of the hind wing is nearly parallel with the outer margin as far down as M^2, being rather wider behind than before R^3.

"On the underside the white area of the fore wing is not suffused with black, but has proximally and in the cell a distinct yellow tone.

"Length of fore wing: ♂ 26 mm.; ♀ 25 mm."

Habitat.—North-east British New Guinea: Mount Groome, situated about 8° S., elevation 11,000 feet. A single pair only known, received by the Tring Museum from A. S. Meek who obtained them from a friend. Types in Tring Museum.

48 (104). *D. leucobalia distincta* Roths. (1915) (pl. xlii, fig.5).

Rothschild 181, p. 7, pl. i, fig. 1 (Snow Mountains).

(Original description).

"♂. Upperside. Fore wing differs from *D. l. leucobalia* in having

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the median third of the fore wing below vein 2 white, not black, and the marginal row of light spots smaller and more obsolete. Hind wing has light area distinctly buff-cream and more extended, so that only the three upper marginal spots are separate from the pale disc; these three spots are dimond-shaped and much larger, and not at all indistinct, as in *l. leucobalia*.

"Underside. Fore wing has pale basal half of wing cream-white, not grey, and all light markings more distinct. Hind wing has all pinkish-white markings much larger, and more distinct, and the orange lines and spots are larger, more extended and more brilliant."

Scent-scale (pl. xxiii, fig. 44). Very similar to *carstenziana*, but narrower and shorter.

Genitalia:—

Valve (pl. x, fig. 47). Distal edge with a short and broad process proximally incurved. Dorsal edge slightly incurved above the middle, rounded posteriorly. Ventral fold broad, but weak and ill-defined. Cavity not seen.

Uncus (pl. xi, fig. 42). Type of Group 1A. Lobes small, short and equal. Tegumen very slightly incurved and broadening posteriorly.

Habitat.—South Dutch New Guinea: Snow Mountains. Discovered on Cartenz Peak, 5,000—10,000 feet, February, 1913, by the Wollaston Expedition. Described from 12 ♂♂. Types in Tring Museum.

49 (105). **D. CATISA** Jord. (1911) (pl. xlii, fig. 6).

Jordan **114**, p. 586 (Mount Goliath).

This species may be distinguished from others of this group by the hind wing of the ♂ above having only a narrow black marginal border. (Original description).

"♂. Supra alba, limbo costali nigro sat lato externo ad cellulam usque dilatato fere gradatim ad angulum posticum angustato; limbo nigro alarum posticarum angusto. Subtus alis anticis colore nigro magis extenso quam supra, area alba sulphureo tincta, fascia brevi ex tribus maculis composita sulphureo-alba inter cellulam et seriem punctorum subapicalium sita; alis posticis fere ut in specie *D. eichhorni* dicta maculis ornata.

"A remarkable species on account of its close agreement with *D. eichhorni* in the markings on the underside of the hind wing. The neuration of the two species shows a constant difference. In *eichhorni*

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the lower angle of the cell of the fore wing is pointed, while it is obtuse in *catisa*, and the cross-vein of the hind wing is distinctly incurved or angulate in *eichhorni* and straight or very feebly incurved in *catisa*. The fore wing of *catisa* is broader than in *eichhorni*, and the hind wing more evenly rounded, being shorter costally.

" The costal border on the upperside of the fore wing is 2 mm. broad ; distal border extends to the cross-vein, there being sometimes diffuse white scaling just outside the black cross-vein, and has a width of 3 mm. at the lower median vein ; one subapical dot is sometimes indicated. The border of the hind wing is 1 mm. wide or less, being nearly restricted to the fringes posteriorly and more or less interrupted at the veins.

" The black costal border on the underside of the fore wing is broader than above, occupying about one-half of the cell ; the disco-cellular bar is broad and joined to the distal border, a short band of three yellowish spots being isolated from the light-coloured area and situated at the subcostal-radial fork. There is a row of three subapical dots, usually followed by two or three submarginal dots : the first dot is yellow, and the second, which is the largest of all, is tinged with yellow proximally, the others being also more or less shaded with yellow. The light-coloured area, which extends to the base of hindmargin, and is anteriorly bounded by vein R^3, is white as far as it is covered by the hind wing and anteriorly more or less deeply suffused with sulphur-yellow ; in *D. eichhorni* this area is uniformly orange. The pattern of the hind wing is the same as in *D. eichhorni* ; but while the white central marking shaped like the figure 3 bears a prominent yellow streak in each cellule in *D. eichhorni*, the streaks are absent, or at most indicated, in cellules R^1—R^2 and R^3—M^1 in *catisa*. Moreover, the fourth and fifth submarginal spots are larger and more triangular ; the last spot is less extended yellow, and the yellow line along SM^2 is appreciably deeper in tone.

" Length of fore wing : 23 mm."

♀. Some specimens of the ♀ of this species were obtained by Messrs. Pratt in the Weyland Mountains. We describe it here for the first time.

Fore wing above with broader black distal and costal area. The white area more or less tinged with yellow. Three very small yellowish and partly suffused spots, one subapical, one costal in cellule 8, and one below it in 5. Hind wing more or less tinged with yellow with the marginal black wider than in the ♂, its edge not sharply defined and with at least a defined spot in 5 where the black is widest.

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Underside as in the ♂.

Described from four specimens from the Weyland Mountains, type from Mount Kunupi, 6,000 feet, November.

Scent-scale (pl. xxiii, fig. 45). Similar to the scales of the other species in this group except that it is shorter and broader.

Genitalia:—

Valve (pl. x, fig. 48). Distal edge with a moderately long and broad finger-like process. Dorsal edge slightly incurved at the middle, posteriorly rounded. Ventral fold strongly developed, posteriorly broad with defined proximal edge. Cavity moderate.

Uncus (pl. ii, fig. 43). Type of Group 1A. Lobes small, short and equal, outer ones slightly curved inward. Tegumen strongly incurved, broad posteriorly. A narrower type than the other species of this group.

Lamina dentata (pl. vi, fig. 17). Long and moderately narrow, distal ends rounded. The middle area of both margins strongly excurved. Teeth well developed but not numerous and leaving a large central area unarmed. Length = *circ.* 1·3 mm., breadth = *circ.* 0·27 mm.

Habitat.—South Dutch New Guinea: Mount Goliath, 5,000—7,000 feet, January to February. Discovered by A. S. Meek in 1911. North Dutch New Guinea: Weyland Mountains, Mount Kunupi, 6,000—8,000 feet, November, December, and January, 1920—1921, C., F., and J. Pratt.

Type ♂ in the Mus. Tring. Neallotype ♀ in Hill Museum.

GROUP 7.

A group of five species inhabiting the mountains of New Guinea. Characters common to all are the black underside of the fore wing and the type of uncus and scent-scale. The species may be easily identified by the type of hind wing pattern described below.

The uncus is of a peculiar type not found in any other group. The edges of the tegumen are inflexed and expanded anteriorly where they are fused together to form either a single lobe or lip or two partly-separated lobes. The single lip is probably a later development and is characteristic of *caroli* and *bornemanni* for example. In forms of *nais* this lip is either distinctly bifurcate or is to some extent incurved. The figures on pl. ii do not show these characters.

The species comprise nine races, none of which appears to be rare where they occur.

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Key to Species.

Hind wing below with a square-shaped red basal patch ...	*castaneus*
Hind wing below with a square-shaped yellow basal patch ...	*pratti*
Hind wing below with a short and narrow red subcostal stripe in cellule 7	*caroli*
Hind wing below with a short and narrow red-brown subcostal stripe in cellule 7, and similarly coloured submarginal spots ...	*bornemanni*
Hind wing below with a short and broad chocolate-brown subcostal stripe in cellule 7, and similarly coloured distal patches ...	*nais*

50 (106). **D. CASTANEUS** Kenr. (1909) (pl. lv, fig. 5).

Kenrick **116**, p. 181, p. vii, fig. 3 (Arfak Mountains).

Joicey and Noakes **106**, p. 364 (Pupa).

Besides the character already mentioned, this species has on the hind wing below a large chocolate-brown area surrounded by sulphur-yellow and bearing a well-marked black discal patch.

♂. Upperside white. Fore wing with distal half black to the end of the cell, its edge not sharply defined, and costa black to the base. Hind wing with narrow black margin becoming merely a line below vein 4.

Underside of fore wing black with white inner margin, white scaling often extended in the median area to the cell. A subapical band of three sulphur-yellow spots, with sometimes a fourth spot in cellule 4. Usually a white dot or spot on the discocellulars.

Hind wing with black ground-colour, but the greater part, to near the distal margin and including distal half of costa, chocolate-brown bordered with sulphur-yellow. The edge of this area is sharply defined and is straight across the middle of the cell to the submedian. A black discal patch of variable size is placed close to the cell in cellule 4, extending into cellule 5 and usually to a less extent into cellule 3. The veins in the chocolate area are grey-white. There is a large red basal costal patch, somewhat rectangular in shape and separated from the distal area by a narrow stripe of the black ground-colour. This patch extends from the margin of the cell to the yellowish-white costal edging, becoming broader on the costa but not reaching the praecostal spur.

In three specimens in the Hill Museum the yellow area on the hind wing is white and the chocolate area appears rather faded. This appearance does not seem to be due to length of time on the wing as it was not apparent in specimens with a much worn appearance.

♀. Upperside with usually a slight yellow tinge. Fore wing with the black area broader on the inner margin and usually extended into

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the end of the cell, leaving a white discocellular dot. Two or three yellowish subapical dots or streaks which may sometimes be obsolete. Hind wing with broader black margins than in the ♂. Underside as in the ♂.

Length of fore wing ♂ ♀ 25—31 mm.

Pupa (pl. liii, fig. 9).—A pupa was found by Messrs. Pratt attached to the stem of a sort of mountain grass. The insect emerged at 3.30 p.m. on February 17, 1914. The description is made from the empty case (cf. Joicey and Noakes). "Head bearing a forked protuberance, the two curved ends of the fork and the pedicel below black. Two short black tubercles at base of head. A dorsal row of black spines on somites 2—7. Two short black lateral spines on the first abdominal somite, 2 lateral black spines on the second, and 4 on the third somite."

Scent-Scale (pl. xxiii, fig. 46). Similar in form to the scales found in Group 6. The thickened edge more extended anteriorly, and a considerable extension of the central core is to be seen.

Genitalia :—

Valve (pl. xi, fig. 49). Distal edge produced to a short finger-like process. Dorsal edge anteriorly nearly straight, posteriorly slightly rounded. Ventral fold broad posteriorly with defined proximal edge. Cavity not seen.

Uncus (pl. ii, fig. 44). Type of Group 7. Tegumen fairly stout, lip short, entire.

Lamina dentata (pl. vii, fig. 48). Short and broad, distal ends rounded. Middle of anterior margin slightly incurved, of the posterior margin strongly incurved. Teeth numerous, stronger on the anterior margin. Length = *circ.* 0·75 mm., breadth = *circ.* 0·13 mm.

Habitat.—North-east Dutch New Guinea: Arfak Mountains. In the Hill Museum from the Angi Lakes, 6,000 feet, January—March, 1914; Warmasin, 6,000 feet, February, 1909, and March, 1910. Discovered by A. E. Pratt, at Warmasin, November and December, and later collected in numbers by his sons at the Lakes.

Types from Warmasin in the British Museum presented by Sir G. H. Kenrick.

51 (107). **D. PRATTI** Kenr., (1909) (pl. lv, fig. 6).

Kenrick 116, p. 177, pl. vi, fig. 2 (Arfak Mountains), ♂.
Joicey and Noakes 106, p. 364, ♀.

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This species is to be recognized by its black upper surface, the inner area of the hind wing above being white.

♂, ♀. Upperside black. Fore wing without markings. Hind wing with an inner white area between cell and inner margin and base and outer margin to vein 4.

Underside of fore wing black, inner margin white except usually near the tornus, and a subapical band of four or five yellow spots as in *castaneus;* from the lower spot a thin antemarginal line runs to the tornus.

Hind wing with black ground colour and the pattern arranged as in *castaneus.* Distal two-thirds vandyke-brown with a rich purple tinge, leaving a narrow marginal border from the costa to inner margin. Proximal half of costa white to vein 8, between which and the cell is a large chrome-yellow basal patch shaped as in *castaneus.* A black discal patch, somewhat oblong, close to the cell in cellules 3 and 4 and extending midway into cellule 5, sometimes almost reaching vein 6.

Length of fore wing, ♂, ♀, 25—29 mm.

Scent-scale (pl. xxiii, fig. 47). Shorter and broader than in *castaneus* and with a proportionately larger disc, yet quite similar in type. These scales occur also over the black area of the hind wing.

Genitalia :—

Valve (pl. xi, fig. 50). Distal edge produced to a straight and narrow, moderately long process. Dorsal edge slightly excurved. Ventral edge slightly incurved, posteriorly excurved. Ventral fold moderately developed, proximal edge defined anteriorly and posteriorly. Cavity small.

Uncus (pl. ii, fig. 45). Type of Group 7. Tegumen long and narrow, lip short and blunt, entire.

Habitat.—North-east Dutch New Guinea: Arfak Mountains. Discovered by A. E. Pratt at Warmasin, 6,000 feet, November and December, and later taken in numbers by his sons at the Angi Lakes, 6,000 feet, January—March.

Type ♂ in the British Museum, presented by Sir G. H. Kenrick; ♀ neallotype in the Hill Museum.

52. D. CAROLI Kenr.

This species is easily recognized by the red submarginal line on the black hind wing below.

There are two races, both in Dutch New Guinea.

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52 (108). *D. caroli caroli* Kenr. (1909) (pl. lv, fig. 11).

Kenrick 116, p. 180, pl. vii, fig. 1 (Arfak Mountains).

♂. Fore wing above as in *castaneus* but with some white dusting beyond end of cell. Hind wing as in *castaneus* but with wider black margin reaching the anal angle.

Fore wing below black with white inner margin as in the preceding species. A submarginal row of five sharply-defined small white spots in cellules 3—8, and sometimes also a spot in 2.

Hind wing black. A heavy red submarginal line formed of five bars connected slightly at the veins by some white scaling; this line extends from vein 7 to just below the submedian, and is connected to the costa by a white bar. A short red basal stripe in cellule 7.

♀ resembles the ♂. Fore wing above with reduced white area which is usually yellow-tinged, especially distally. A submarginal row of five yellowish white dots. Hind wing with wider black border than in the ♂, the bluish-white area tinged with yellow distally. Underside as in the ♂.

Length of fore wing: ♂ 29 mm., ♀ 28—31 mm.

Scent-scale (pl. xxiii, fig. 48). Resembles the scale of *castaneus* but is broader posteriorly.

Genitalia :—

Valve (pl. xi, fig. 51). Distal edge produced to a short finger-like process. Dorsal edge nearly straight. Ventral fold broad posteriorly, its proximal edge anteriorly very weak. Cavity not seen.

Uncus (pl. ii, fig. 46). Type of Group 7. Tegumen long, narrow posteriorly, and broad at the base. Lobe short, lip broad and entire.

Lamina dentata (pl. vii, fig. 51). Short and narrow, distal ends rounded. The unarmed middle area of the anterior margin is as long as one lobe and is incurved, and respectively of the posterior margin shorter and excurved. Teeth well developed. Length = *circ.* 0·75 mm., breadth = *circ.* 0·13 mm.

Habitat.—North-east Dutch New Guinea: Arfak Mountains. Discovered by A. E. Pratt at Warmasin, 6,000 feet, November and December. Later a small series was taken by Mr. Pratt's sons at the Angi Lakes, 6,000 feet, January—March, 1914. Also in the Hill Museum from Warmasin, March.

Types in the British Museum, presented by Sir G. H. Kenrick.

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52 (109). *D. caroli* f. *flava* J. and N. (1915).

Joicey and Noakes **105**, p. 61, pl. vi, fig. 3.

♂. This specimen only differs from the typical form in having the red markings on the hind wing sulphur-yellow.

Collected by A., E., and F. Pratt at the Angi Lakes in March.

Type in the Hill Museum.

53 (110). *D. caroli wandammenensae* J. and T. (1916).

Joicey and Talbot **107**, p. 71, pl. v, fig. 2 (Wandammen Mountains

♂. Fore wing with reduced white area which extends to just beyond middle of cell and not into cellule 3 nor to the tornus. Hind wing with black border wider than in the typical form.

Underside of fore wing with usually only three white subapical spots, sometimes four. Hind wing with the red submarginal line more broken at the veins and not connected with the white costal bar.

♀. White area still more reduced, tinged with yellow distally, Fore wing with indistinct submarginal dots. Underside of fore wing with submarginal spots as in *caroli caroli*.

Habitat.—North-east Dutch New Guinea: Wandammen Mountains, 6,000 feet, November 1914. Discovered by A., C., and F. Pratt.

Types in Hill Museum.

53 (111). **D. BORNEMANNI** Ribbe (1900).

Ribbe **166** p. 308 (Aroa River); **167**, p. 339, t. 8, fig. 2 ♂.

Rothschild **178**. p. 313 (Upper Aroa River); **182**, p. 676.

This species is recognized by the reddish (not chocolate) brown markings on the hind wing below. The basal stripe does not extend into the cell as it does in the forms of *nais*. Lord Rothschild (**182**, p. 676) indicates his opinion that the forms placed by us with *nais* are all races of *bornemanni*. If there are two species, they are very closely allied in pattern, it is true, but equally small points of difference are to be noticed in the uncus and scent-scale. In this species the scale is of almost uniform width posteriorly, but in *nais* it is excurved from the base. The lower lip of the uncus is entire, which is not the case in *nais* forms.

On p. 27 of this monograph we have placed *keysseri* Roths. as a subspecies. We now refer this race to *nais* Jord.

The *lamina dentata* in this species is quite distinct from the structure seen in *nais*. Several forms already considered as races by

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their external resemblance may well be as differentiated as most species, such as for example *D. belisama glauce*.

♂. Fore wing above with white proximal area not reaching the end of cell, nor extended above vein 3 nor to the tornus. Hind wing with black marginal border about 6 mm. wide on vein 6, narrowing posteriorly.

Underside of fore wing as in *caroli*. Subapical white spots a little larger, 3 or 4 in number. Hind wing black with red-brown markings. A short and broad stripe occupying the base of cellule 7, a small rounded discal spot placed in the end of the cell against the cross-veins, a short distally pointed stripe below the cell in 1c, five submarginal spots, those in 2 and 6 placed more proximal than the other 3, not rounded and usually pointed on the inner edge. A small white costal spot (sometimes indistinct) above the anterior red one.

♀. Both wings with slightly extended black area. Fore wing with subapical white spots. Underside as in the ♂. Fore wing with 4 subapical spots, sometimes a minute fifth spot.

Length of fore wing: ♂ ♀ 27—30 mm.

Scent-scale (pl. xxiii, fig. 49). Very similar to *caroli* but longer and at the base narrower.

Genitalia:—

Valve (pl. xi, fig. 52). Distal edge produced to a short and broad process. Dorsal edge nearly straight, slightly incurved at the middle. Ventral fold very broad but only defined at the middle proximal edge. Cavity moderate.

Uncus (pl. ii, fig. 47). Type of Group 7. Tegumen stout and broad, well rounded dorsally and with strong ventral thickening. Lobe of moderate length, lip short and broad, without any cleft or concavity.

Lamina dentata (pl. vii, fig. 44). Short and of moderate width, distal ends oblique. Middle of anterior edge incurved, of the posterior edge slightly excurved. Teeth strongly developed. Length = *circ.* 0·97 mm., breadth = *circ* 0·13 mm.

Habitat.—South-west British New Guinea: Aroa River, discovered by Emil Weiske. Taken also by Meek at Owgarra, end of May, and on the Angabunga River, 6,000 feet, November—February. North-British New Guinea: Taken by Eichhorn Bros. in the Hydrographer Mountains, 2,500 feet, January—May.

Holotype ♂ in the Tring Museum.

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54. D. NAIS Jord.

This species is distinguished by the hind wing below having chocolate-brown markings with large patches in the distal area. The basal stripe extends into the cell.

The scent-scale is distinct from that of *bornemanni*.

Four races are known.

54 (112). *D. nais keysseri* Roths. (1925).

Rothschild **182**, p. 676 (Rawlinson Mountains).

♂. Fore wing above with proximal white area not reaching end of cell, extended slightly above vein 3 and also to near the tornus. Hind wing with narrow black marginal border as in *nais*.

Underside of fore wing with white inner margin. Three small white subapical spots, sometimes a fourth spot in 4. Hind wing with brown markings as in *nais* but sometimes darker. Basal patch extended to below the cell, its outer edge sharply defined from vein 7 to the lower edge of cell. Marginal patches in 2 and 3 shorter than in *nais*.

♀. Similar to the ♀ of *nais nais*, without a yellow tinge. Fore wing with black area more extended into end of cell, and hind wing border white.

A larger insect than *bornemanni* or other *nais* forms.

Length of fore wing: ♂ 29—32 mm. ♀ (from a specimen in the Hill Museum) 30 mm.

Habitat.—North-east British New Guinea: Rawlinson Mountains (types); Cromwell Mountains.

Types in Tring Museum.

54 (113). *D. nais nais* Jord. (1911) (pl. lviii, fig. 1).

D. bornemanni nais Jordan **114**, p. 587 (Mount Goliath).

D. bornemanni rubrina V. Eecke **32**, p. 59, pl. ii, fig. 5 (Central Dutch New Guinea); **33**, p. 190 (= *nais* Jord.).

♂. Fore wing above with white area reaching at least the lower angle of cell and sometimes extended to beyond end of cell; it extends also to near the tornus. Hind wing with narrow black marginal border.

Underside of fore wing as in *bornemanni*, with three subapical white spots. Hind wing with basal stripe only slightly extended into the cell, its outer edge reaching only the upper edge of cell. The other patches as in *keysseri*, the ones in 2 and 3 mostly larger, cell-spot variable but usually rather large.

♀. Black distal area of fore wing more extended black, border of hind wing wider. White areas slightly yellow-tinged.

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Length of fore wing: ♂ ♀, 27 mm.

Habitat.—South Dutch New Guinea: Mount Goliath, 5,000—7,000 feet, February—March, discovered by Meek. Central Dutch New Guinea, December, 1912.

54 (114). *D. nais denigrata* J. and T. (1926).

Joicey and Talbot 112, p. 3 (Weyland Mountains).

D. bornemanni nais Jord., Rothschild 181, p. 6 (Snow Mountains).

D. nais Jord., Joic. and Talb. 108, p. 309 (Weyland Mountains).

This race is distinguished by the reduced area of black on the hind wing below.

♂. Upperside of fore wing with white area slightly more extended in cellule 3.

Underside of hind wing with the brown cell-patch larger than in *nais nais* and usually joined to the basal stripe or only narrowly separated from it. In the distal area the veins are more narrowly black, the brown patches being wider and longer than in *n. nais*, leaving a smaller postdiscal black area.

♀. Upperside of hind wing with slightly wider black border than in *n. nais*, in other respects like this ♀. Underside as in the ♂.

Scent-scale (pl. xxiv, fig. 50). Similar to *bornemanni* but excurved posteriorly, thus resembling *pratti* but longer. More flask-shaped than others of the group. These scales are, at least in the area adjacent to the white area, more numerous than the colour scales. The scales of *nais* and of *bornemanni* are each fairly constant in form and quite distinct.

Genitalia.—

Valve (pl. xi, fig. 53). Distal edge with a short and narrow process proximally excavated. Dorsal edge nearly straight, slightly excurved posteriorly. Ventral fold narrow. Cavity not seen.

Uncus (pl. ii, fig. 48). Type of Group 7. Tegumen long and moderately broad, well rounded dorsally, slightly thickened ventrally. Lobe long, lip short and broad, distinctly cleft or incurved.

Lamina dentata (pl. vii, fig. 52). Short and narrow, distal ends rounded. The middle of both margins incurved. Teeth well developed. The difference between the plate of this species and that of *bornemanni* (fig. 44) is greater than would be the case if these insects belonged to one species.

Habitat.—North Dutch New Guinea: Weyland Mountains, 4,000—8,000 feet. November, December and January, also a long series taken

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by Pratt Bros. South Dutch New Guinea: Snow Mountains, 4,000—6,000 feet, January and February, 1913, taken by the Wollaston Expedition.

Types in Hill Museum.

54 (115). *D. nais aegle* J. and T. (1922).

Joicey and Talbot **108**, p. 310 (British New Guinea).

D. bornemanni aegle J. and T., Rothschild **182**, p. 676 (British New Guinea).

♂. Upperside of fore wing as in *bornemanni*, the white area being smaller than in other *nais* forms. Hind wing with wider black border than in other *nais* forms, but narrower than in *bornemanni*.

Underside of fore wing as in other *nais* forms. Hind wing with small brown patches. Basal stripe as in *nais nais*, cell-spot smaller and ovate, distal patch 2—6 shorter than in other forms, leaving a greater extent of black. The appearance of this pattern is transitional between *nais nais* and *bornemanni*.

♀. Upperside of fore wing with white area slightly smaller than in the ♂, tinged with yellow distally, two white subapical dots. Hind wing with much wider black border than in the ♂. Underside as in the ♂.

Habitat.—North British New Guinea: Biagi, Mambare River, 5,000 feet, January—April, 1906, discovered by Meek. Only a few specimens known.

Types in the Hill Museum.

GROUP 8.

A small group of four species having relationship with Groups 9 and 10. Confined to the mountains of New Guinea and, with the exception of *bakeri*, not taken commonly.

The species are all characterized on the hind wing below by having a red submarginal line which is distally edged narrowly with white, except in *iltis* where this white edging takes the form of submarginal white spots.

The group contains two types of scent-scale and two types of uncus, indicating two subgroups, either of which may not have been derived from the other. We bring them together here now as they do not fit into the other groups. Several other species of similar aspect probably await discovery, and then one may find a revision of this group necessary. These remarks will apply equally to other groups which are not homogeneous in pattern, scent-scale or uncus.

Five races are at present known.

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Key to Forms.

1. Costa of hind wing below white above the yellow subbasal stripe ... *callista*
   Costa of hind wing below black to the base 2
2. Hind wing below with a yellow subbasal stripe not edged with white 3
   Hind wing below with a yellow subbasal stripe edged with white ... *bakeri*
   Hind wing below with a red subbasal stripe edged with white ... *mesoblema*
3. Fore wing above with white area extended beyond end of cell ... *iltis iltis*
   Fore wing above with white area not reaching above vein 3 ... *iltis luctuosa*

55. D. ILTIS Ribbe.

This species is distinguished by the hind wing below bearing a row of triangular white spots bordering the red submarginal line.

The uncus belongs to type 3, agreeing in this respect with *mesoblema*. *D. iltis* also agrees with *mesoblema* in its scent-scale which, besides being posteriorly broader, has a larger disc than the scent-scale of *bakeri* and *callista*.

55 (116). *D. iltis iltis* Ribbe (1900).

Ribbe **166**, p. 346 (British New Guinea).

Smith and Kirby **203**, *Del.* ix, p. 32, figs. 1, 2 ♂, 3 ♀.

Fruhstorfer **68**, p. 129, t. 56e.

♂. Upperside of fore wing with white area extended to beyond end of cell, its edge sharply defined, angled in cellule 4, incurved from the angle to vein 3, excurved to vein 2 and curved inwards to the inner margin close to the tornus. Costa black to the base and connected with a black discocellular bar. Two white subapical dots in the black distal area. Hind wing with narrow black marginal border sometimes reduced to a mere line.

Underside of fore wing with white area as above, though broadly invaded by black on the discocellulars, and its edge less evenly defined. Three yellow subapical spots and two much smaller ones near the margin in 3 and 4. Hind wing with a short and narrow chrome-yellow stripe at the base of cellule 7, separated by a little more than its width by a black stripe of ground-colour which surrounds a large white discal area. This white area is slightly tinged with yellow and bears more or less some pink scaling in the cell. The red submarginal line is sharply defined and extends from the apex to close to the anal angle; it is excurved in cellule 4 below which it becomes farther away from the margin. This red line is bordered by a row of six triangular white spots, their apices touching the margin. The costa is black to the base. Inner marginal area from the base to near the submarginal line greenish-yellow.

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♀. Upperside of fore wing with more extended black which forms a broad bar on the discocellulars which are sometimes only defined by a narrow and obscure white prolongation beyond the cell. Three to four small white subapical spots. Hind wing with much wider black border than in the ♂, sometimes reaching to over 7 mm. on vein 4. This border bears five white spots of moderate size, the ones in 2 and 3 smaller and less distinct than the others.

Underside of fore wing with slightly more extended white area than above, subapical spot larger than in the ♂. Hind wing as in the ♂ except that the red line is nearer the margin and the white submarginal spots are smaller.

Length of fore wing, ♂ ♀ 28—31 mm.

Scent-scale (pl. xxiv, fig. 51). Broader and more rounded posteriorly than the scales of the preceding group. Disc larger, being of moderate size.

Genitalia:—

Valve (pl. xi, fig. 54). Distal edge produced to a short and broad process. Dorsal edge nearly straight, posteriorly rounded. Ventral fold very broad posteriorly, with defined proximal edge. Cavity large.

Uncus (pl. ii, fig. 49). Type of Group 3. Middle lobe broad and slightly incurved at the apex. Tegumen excurved below the lobe, thence sharply incurved and oblique. The outer lobes of this uncus are not completely differentiated and may be described as rounded shoulders.

Habitat.—South-west British New Guinea: Aroa River. Also collected by Meek at Owgarra on the Upper Aroa, at the end of May, and on the Angabunga, 6,000 feet, November—February.

Types in Mus. Tring.

55 (117). *D. iltis luctuosa* Jord. (1911).

Jordan **114**, p. 584 (Mount Goliath).

(Original description.)

" ♂. A subspecie *D. iltis iltis* dicta alis anticis pro maxima parte nigris, posticis late nigro marginatis distinguenda.

" The white area on the upperside of fore wing extends from the hind margin to M^1 and is much shaded with black in the cell. There is no white spot distally to the apex of the cell, excepting three subapical dots; the black border is 6 mm. broad at the hind margin. The black margin of the hind wing moderately narrows behind, measuring 5 mm. in breadth at R^2; its inner margin is diffuse. It bears three white submarginal dots.

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"On the underside the white area of the fore wing reaches to the lower angle of the cell and the base of R^3, there being also a faint trace of a white mark beyond the apex of the cell; the black border more strongly narrows posteriorly than above; the yellow subapical band is slightly broader than in *D. iltis*. The central area of the hind wing is more uniformly suffused with sulphur-yellow than in *D. iltis*, the red line is thinner and the white spots placed at its outer side are smaller and more triangular, and the black marginal spots consequently larger.

"Length of fore wing, 29 mm."

Habitat.—North-east British New Guinea: Mount Greome, 11,000 feet. Described from a single ♂ sent to the Tring Museum by A. S. Meek, who received it from a friend.

Type in the Tring Museum.

55 (118). **D. MESOBLEMA** Jord. (1911) (pl. xlii, fig. 8).

Jordan **114**, p. 584 (Mount Goliath).

Rothschild **181**, p. 7 (Snow Mountains).

♂. Upperside of fore wing with the white area usually extended well beyond end of cell, but in one specimen from Mount Kunupi it only fills the base of cellule 4; its outer edge is well defined and formed as in *iltis* but without any angle. Costa black to the base. One or two white subapical dots. Hind wing white with black fringe.

Underside of fore wing as above, but with two yellow subapical spots, the lower the larger, and three small antemarginal spots in 3—4, also a dot in 2.

Hind wing pattern somewhat as in *bakeri*, but differs from any other species of the group by the presence of a red cell-stripe placed close to the median, and a red stripe in the base of cellule 6 extending into 7, where it is bordered by a white stripe which is limited by the costal vein. This subbasal stripe was somehow not mentioned by the author in his original description. A large white discal area bears indistinct yellow patches, one in the cell-end and others in cellules 2—5. This distal area is limited anteriorly by vein 6 and the cell-margin, posteriorly by vein 2, extends in the cell to the base of the red stripe, and distally extends to more than midway between the cell and margin, its distal edge more rounded. The submarginal red line is narrowly separated from the edge of the white area by the black ground-colour, and is bordered by large white patches only separated by black vein-streaks. The narrow black margin forms short triangular spots between the white patches on veins 2—5. In cellule 1b from near the base to the

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anal angle is a narrow and sharply-defined sulphur-yellow stripe, representing another characteristic feature of this species.

♀. White area reduced and sometimes tinged with yellow. Hind wing with black marginal border of nearly even width, 4—4·5 mm. on vein 4. This border may sometimes bear a row of five white spots, the two anterior ones more distinct than the others.

Underside of the hind wing as in the ♂, except that the red line is nearer the margin and the white spots are smaller.

Length of fore wing, ♂ ♀ 25—29 mm.

Scent-scale (pl. xxiv, fig. 52). Resembles *iltis* but is more rounded posteriorly.

Genitalia:—

Valve (pl. xi, fig. 55). Distal edge produced to a short and narrow process. Dorsal edge nearly straight, posteriorly rounded. Ventral fold broad posteriorly with a defined proximal edge. Cavity with a large flap.

Uncus (pl. ii, fig. 50). Type of Group 3. Shorter and narrower than in *iltis*. Middle lobe broad and slightly incurved at the apex. Tegumen sharply excurved below the lobe, thence incurved and broadening posteriorly.

Habitat. — South Dutch New Guinea: Mount Goliath, about 5,000 feet, January—March. Discovered by Meek, who took a few specimens. Snow Mountains, 4,000—6,000 feet, January—February, 1913, ten ♂ ♂ taken by the Wollaston Expedition.

North Dutch New Guinea: Weyland Mountains, Mount Kunupi, 6,000 feet, November — January, two ♂ ♂ two ♂ ♂ taken by the Pratt Bros.

Types in Mus. Tring. The ♀ figured on plate xlii is from a specimen from Mount Kunupi.

57 (119). **D. BAKERI** Kenr. (1909) (pl. xlii, fig. 9).

Kenrick 116, p. 178, pl. vi, fig. 4 ♂ (Arfak Mountains) ♂ ♀.

This species is not rare, but is only known from the Arfak. On the hind wing below it resembles *mesoblema*, but is distinguished by the absence of a yellow submedian stripe, and by the presence of a somewhat quadrate subcostal patch which is half yellow and half white.

♂. Upperside of fore wing with white area reaching to beyond end of cell to a variable extent, its edge nearly straight from vein 4 to inner margin and farther from the tornus than in *mesoblema*. Hind wing with a narrow black border between veins 4—6.

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Underside of fore wing with white area less extended beyond the cell and rarely into cellule 5. Three yellow subapical spots placed farther from the apex than in *mesoblema*. A broken thin antemarginal line which in cellule 3 and 4 forms two spots.

Hind wing with the pattern similar to *mesoblema*. In cellule 7, a subbasal somewhat quadrate patch, its lower half yellow, its upper half white. Costa black to the base. White discal area narrower and more ovate than in *mesoblema*, being reduced below the cell. The red submarginal line is heavier than in *mesoblema*; it is bordered by smaller white spots which are only separated by black veins and become larger posteriorly. The black outer border is therefore much wider than in *mesoblema*. White area traversed by a yellow longitudinal stripe. Inner margin more or less dusted with greenish-yellow.

♀. Black margin of both wings much wider than in the ♂. Fore wing with two white subapical dots.

Underside of fore wing as in the ♂, white areas as above.

Hind wing as in the ♂.

Length of fore wing, ♂ 27—29 mm., ♀ 24·5—28 mm.

Scent-scale (pl. xxiv, p. 53). Narrower than the preceding species with straighter edges and smaller disc. Thickened edges more extended anteriorly.

Genitalia :—

Valve (pl. xi, fig. 56). Distal edge with a short and broad process. Dorsal edge nearly straight, posteriorly excurved. Ventral fold narrow, not defined posteriorly. Cavity with a large flap.

Uncus (pl. ii, fig. 51). Type of Group 1c, quite distinct from the preceding species. Lobes narrow and well separated, middle one longer. Tegumen incurved, broad posteriorly.

Lamina dentata (pl. vii, fig. 49). Short and moderately narrow, distal ends rounded. The unarmed middle area of anterior margin as long as a lobe and incurved, of the posterior margin shorter and strongly excurved. Teeth moderate, fewer on the lobes. Length = *circ.* 0·72 mm., breadth = *circ.* 0·16 mm.

Habitat.—North-east Dutch New Guinea: Arfak Mountains. Discovered by A. E. Pratt at Warmasin, 6,000 feet, November and December, 1908, also taken in February and March, 1909. A series also collected by A., C., and F. Pratt at the Angi Lakes, 6,000 feet, January—March, 1914; also taken at Momi at 4,000 feet, March.

Type ♂ in the Hill Museum. ♀ allotype in British Museum. We figure the type.

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58 (120). **D. CALLISTA** Jord. (1911) (pl. xlii, fig. 10 ♀, 11 ♂).

Jordan **114**, p. 582 (Mount Goliath) ♂ ♀.

This species is characterized on the hind wing below by orange-yellow submarginal spots, and by a red stripe which crosses the cell near the base and extends along vein 2 for its proximal half.

According to the uncus its affinities may be more with *hapalina* than with *bakeri*.

The ♀ occurs in two colour forms, and is very different to the ♂, resembling the ♀ of *hapalina conspectirubra*.

The species occurs on Mount Goliath and in the Snow Mountains. (Original description).

" ♂ ♀. Alis posticis area centrali paginae inferioris aurantiaca (♂) vel luteoalba (♀) usque ad ramum costalem producta versus basin et pone cellulam rubro marginata, linea postmediana rubra lunata extus lunulis albis signata, macula costali basali flava.

" The sexes are remarkably different.

" ♂. Upperside white. The black costal border of the fore wing does not enter the cell; the discocellulars are black, but this bar is a mere line, being very much thinner than in *D. iltis*; the black outer border does not quite extend down to the subcostal fork and is a little wider below the centre of the wing than in *D. iltis*. There are two small white subapical dots. The black border of the hind wing is very thin, being restricted to the fringe and the extreme edge of the wing and slightly widened at the veins.

" The underside of the fore wing is white. The discocellular bar is broad and triangular, but less broad than in *D. iltis*. Before the apex there is a curved row of three orange spots, the row being continued along the distal margin by some minute dots. The hind wing has the black markings almost exactly as in *D. iltis*, but the central area and the submarginal spots are of a beautiful orange colour. The central area has a somewhat diffuse white border, between which and the black stripe there is a red border proximally in the cell and below it; the portion of central area which lies in front of the cell is costally pointed and externally incurved, being much smaller than in *D. iltis* on account of the greater development of the black, the black lines being broadly united at the costal margin; a small ovate discocellular spot is white. The black discal line is produced outward at the veins, the red line following it being lunate. This red line is outwardly bordered by white lunules, upon which follow the orange submarginal spots, which are larger than the corresponding (white) spots of *D. iltis*; as a rule these

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spots are more or less reddish at the white lunules. The black border of the wing is thinner than in *D. iltis*.

" ♀. There are two colour-varieties of this sex; in the one the ground-colour of both wings above and of the fore wing beneath is white, while the fore wing is yellow in the other above and beneath, the upperside of the hind wing being anteriorly also more or less yellow. The two forms are otherwise alike.

" Upperside: The black border of the fore wing enters the apex of the cell, the black discocellular bar being completely united with it, some specimens bearing a small white spot below the costal margin as an indication of the interspace existing in the ♂ between the bar and the band; the marginal band is 6 mm. wide at the submedian vein. There are three small subapical dots. The marginal band of the hind wing is 7 mm. wide in the centre, being posteriorly a little broader than anteriorly; it is as sharply defined as on the fore wing, and does not bear any light spots, its inner edge being slightly diffuse posteriorly on account of the long white hairs of the abdominal area.

" On the underside the black marginal band of the fore wing is narrower posteriorly than above and its edge less regular, the subcostal spot situated beyond the cell is larger, and there are subapical orange spots as in the ♂, but somewhat larger. The hind wing differs from that of the ♂ in the much greater extent of black, and a corresponding reduction of the light markings. Moreover, the central area is white with a peculiar buffish tone, and the band of red and white lunules is more distal and the orange spots at its outer side are reduced to two or three spots before the anal angle and more or less indistinct traces of them farther forward.

" Length of fore wing, ♂ 30 mm., ♀ 29 mm."

Scent-scale (pl. xxiv, fig. 54). Resembles *bakeri*, but is longer, with still more extended thickened edges, and longer central core.

Genitalia:—

Valve (pl. xi. fig. 57). Distal edge with a long finger-like process of nearly equal width. Dorsal edge slightly incurved at the middle. Ventral fold narrow, defined posteriorly. Cavity large.

Uncus (pl. ii, fig. 52). Type of Group 1F. Middle lobe short, outer ones longer and directed inward. Tegumen strongly incurved, broad posteriorly.

Habitat.—South Dutch New Guinea: Mount Goliath, 5,000—7,000 feet, January—February, 1911, discovered by A. S. Meek. Also taken by Meek in the Snow Mountains, 3,500 feet, October—December, 1910.

Types in Mus. Tring.

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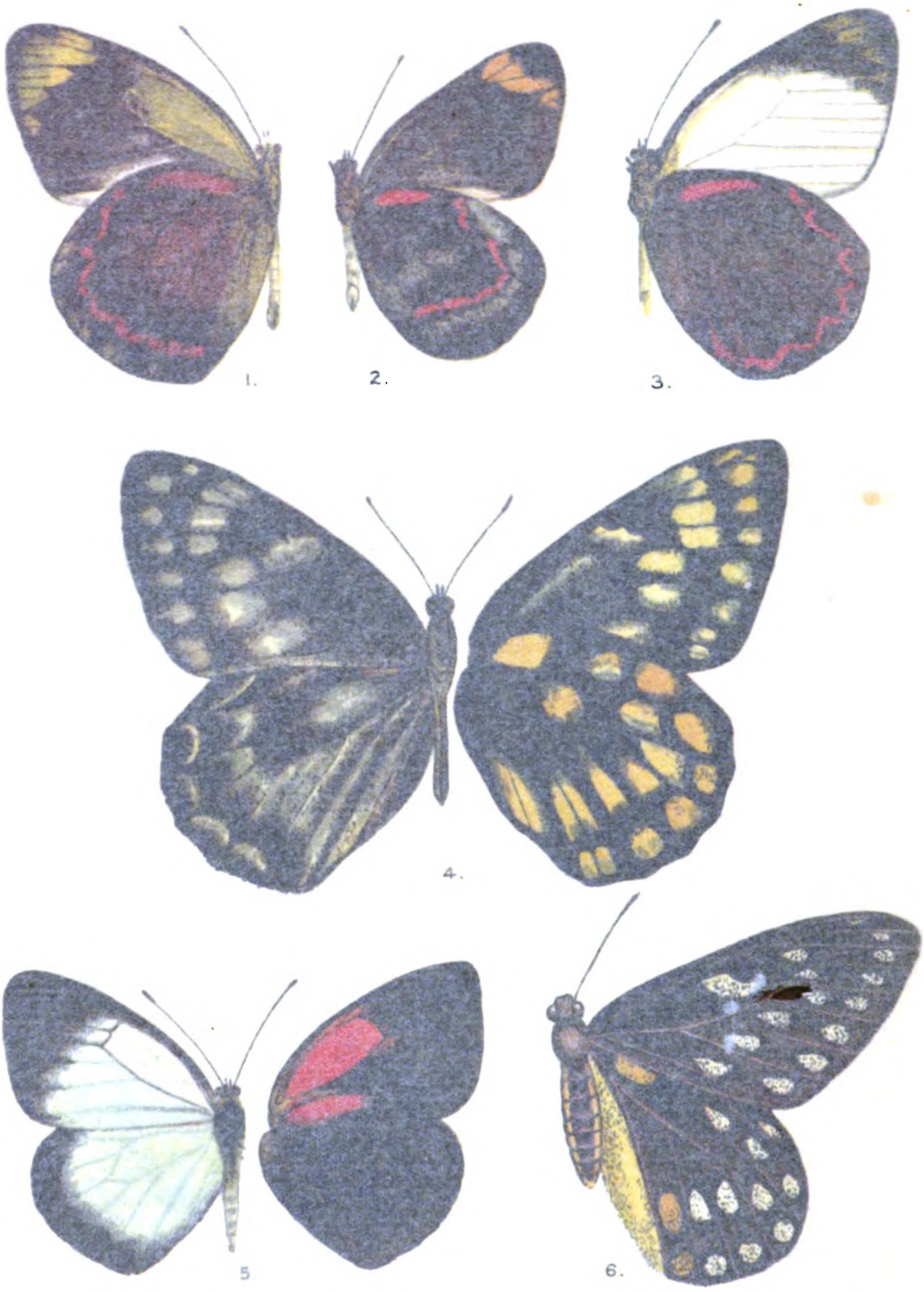

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EXPLANATION OF PLATE LVI.

		Species No.
Fig. 1.	*D. duris* Hew., ♂	150
,, 2.	*D. nigrina* Fabr., ♂	153
,, 3.	*D. funerea buruana* Roths., ♂	151
,, 4.	*D. belladonna surprisa* Mart., ♀ allotype ...	173
,, 5.	*D. eximia* Roths., ♂	149
,, 6.	*D. belladonna belladonna* Fbr., ♀ type ...	166

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EXPLANATION OF PLATE LVII.

		Species No.
Fig. 1.	*D. henningia henningia* Eschs., ♂	175
,, 2.	*D. henningia ottonia* Semp., ♂	181
,, 3.	*D. henningia pandemia* Wall., ♂ ...	182
,, 4.	*D. crithoe crithoe* Bdv., ♂	185
,, 5.	*D.* ,, ,, ♀.	
,, 6.	*D. aglaia parthenope* Wall., ♂	197
,, 7.	*D.* ,, ,, ♀.	

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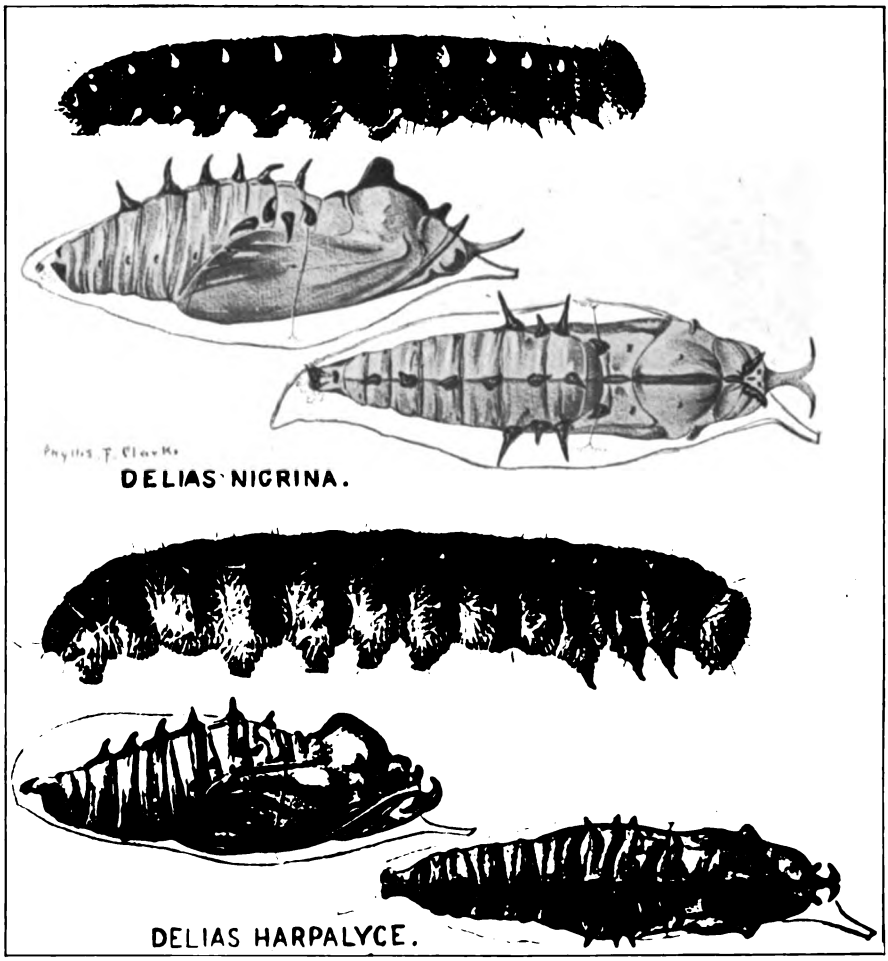

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EXPLANATION OF PLATE LXVIII.

(From drawings lent by Dr. G. A. Waterhouse.)

Delias nigrina Fabr. Larva and pupa.
„ *harpalyce* Don. Larva and pupa.

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EXPLANATION OF PLATE LXIX.

(From drawings lent by Dr. G. A. Waterhouse.)

D. (*Piccarda*) *argenthona* Fabr. Pupa.
Delias aganippe Don. Larva and pupa.

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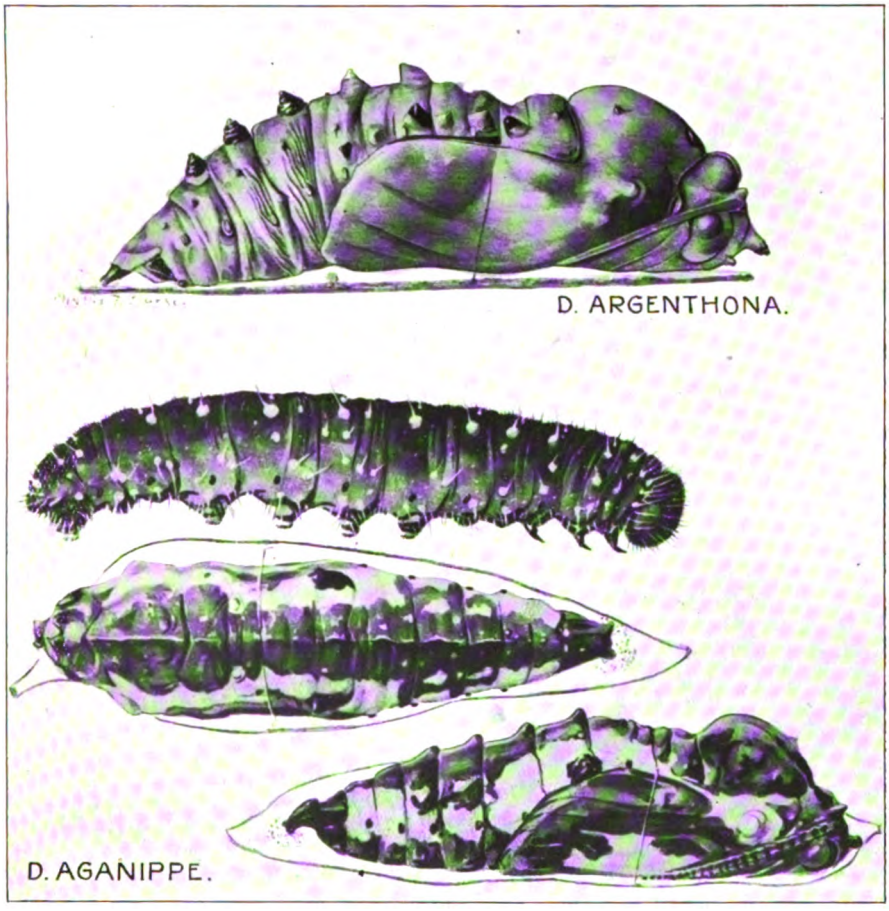

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EXPLANATION OF PLATE LXX.

(From a photograph lent by Dr. G. A. Waterhouse.)

Pupæ of *Delias harpalyce* Don. on the web.

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1.

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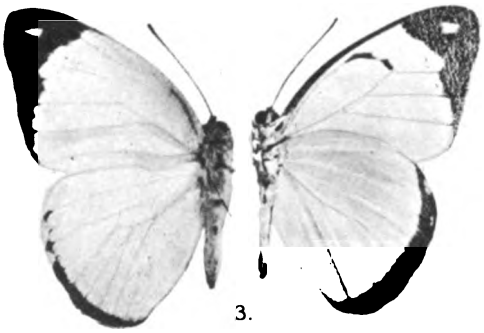

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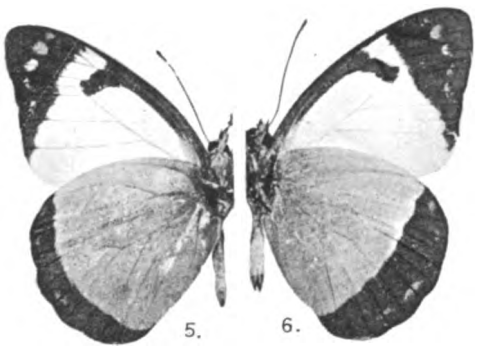

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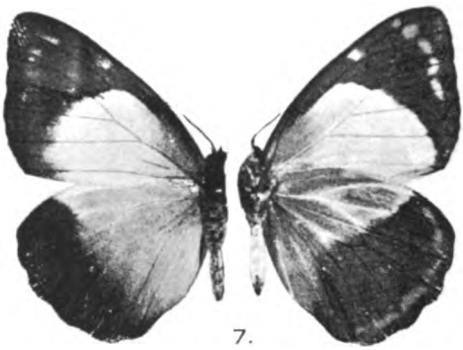

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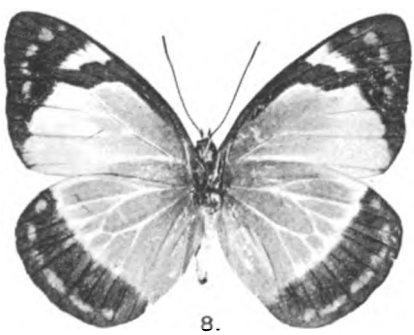

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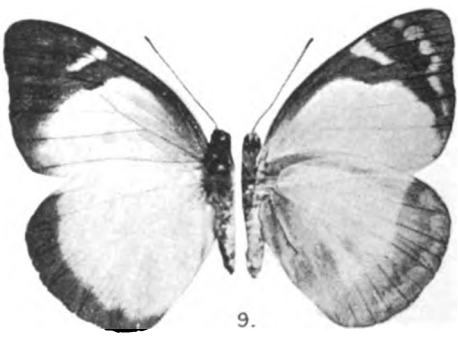

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EXPLANATION OF PLATE XXXIX.

		Species No.
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„ 3.	*D. enniana reducta* Roths., ♂ type ...	40
„ 4.	*D.* „ „ „ ♀ allotype ...	40
„ 5.	*D. dice latimarginata* J. and T., ♂ ...	45
„ 6.	*D.* „ „ „ ♂ type.	
„ 7.	*D.* „ „ „ ♀ allotype.	
„ 8.	*D.* „ „ „ ♀.	
„ 9.	*D. dice fulvoflava* Roths., ♀	46

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61
2
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A

MONOGRAPH

OF THE

PIERINE GENUS *Delias*

BY

G. TALBOT

PART V

Pages 220-259. Plates xl, xli, xlii, xliii, lviii, lix.

Issued July 28, 1930

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GROUP 9.

The six species contained in this group are peculiar to the mountains of New Guinea. They are related to both Group 8 and Group 10.

The fore wing below has always a white or orange proximal area. The hind wing below has always a subbasal stripe which is either white, yellow or red. All the species have a red submarginal line, brown-red in *callima*.

The scent-scale is often like that of Group 8 but tends to become broader, some species having quite a spatulate scale.

The uncus of four species resembles that found in Group 8 and has a characteristic triangular appearance. A further development of this type of uncus is seen in the last two species of this group, where the tegumen becomes anteriorly very broad and rounded.

The valve is not in any way of peculiar type and much resembles that of the species in Groups 8 and 10.

The species are divided into ten races distributed from the Aroa River to the Wandammen Mountains.

Key to Species.

1.	Hind wing below without a red spot or stripe below the cell ...	2
	Hind wing below with a red spot or stripe below the cell	3
2.	Hind wing below mostly white...	*hapalina*
	Hind wing below mostly black...	*campbelli*
3.	Fore wing below with orange proximal area	*weiskei*
	Fore wing below with white proximal area	4
4.	Hind wing below black with reddish-brown markings	*callima*
	Hind wing below without reddish-brown markings	5
5.	Hind wing below with a thin white subbasal stripe	*phippsi*
	Hind wing with the subbasal stripe red edged with white	*marguerita*

59. D. HAPALINA Jord.

The pattern of the hind wing in this species is mostly white, the black ground-colour cutting off a rounded white discal area in both sexes. The subbasal stripe is yellow or partly white. The ♀ is like the ♂ in the typical form, but in the others it looks rather different to the ♂ because the black area on the hind wing is much greater and the red line is but narrowly edged with white.

Three races are known, but the species has not been found in the British area of New Guinea.

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59 (121). *D. hapalina hapalina* Jord. (1911).

Jordan **114**, p. 583 (Mount Goliath) ♂ ♀.

(Original description).

"♂ ♀. Alis posticis infra area centrali alba nigro circumscripta, fascia nigra postmediana extus rubro marginata, fascia cretacea submarginali lata, macula basali flava ornatis.

"♂. Upperside white. The black costal border of the fore wing does not enter the cell. There is no discocellular bar; the black marginal band anteriorly extends to the subcostal fork and gradually narrows to a point posteriorly. There is a faint trace of a white subapical dot. The fringe and extreme edge of the hind wing are black.

"On the underside the fore wing bears a narrow discocellular bar and three or four yellow subapical spots, the marginal band being centrally narrower than on the upperside. The central area of the hind wing is more rounded than in *D. iltis* and the preceding species, the part situated in front of the cell being essentially larger; the area is white with a distinct buffish yellow tint in the centre. The black postmedian band is narrower than the black streak situated before the abdominal area, and is not lunate as in the previous species. The red line bordering the black band is thin, being usually interrupted below the bend. It forms the inner border of a pure white submarginal band, which is, below the middle, half as wide as the central area. This band is not at all broken up into spots, the black marginal border being thin and only slightly widened at the veins, and this chiefly owing to the margin itself being a little scalloped.

"♀. The ground has a faintly yellowish tint. The fore wing above bears two white subapical dots and the black marginal band is a little wider from the centre backward than in the ♂, measuring nearly 2 mm. at the hind angle. The black border of the hind wing is as thin as in the ♂.

"The underside is as in the ♂, except for the fore wing having a yellowish tone proximally and distally, the yellow subapical spots being larger, the centre of the hind wing rather more extended yellowish, and the black bands and the red line visibly broader.

"Length of fore wing: 24 mm."

Genitalia :—

Valve (pl. xi, fig. 58). Distal edge produced to a short and moderately broad process. Dorsal edge nearly straight,

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posteriorly slightly rounded. Ventral fold broad, with defined proximal edge. Cavity not seen.

Uncus (pl. ii, fig. 53). Type of Group 3. Middle lobe short, broad and triangular. Tegumen sharply excurved below the middle lobe, forming a broad and rounded outer lobe; posteriorly the tegumen becomes sharply incurved and oblique.

Habitat.—South Dutch New Guinea: Mount Goliath, 5,000—7,000 feet, February, 1911. Discovered by A. S. Meek, who obtained a small series of both sexes.

Types in the Mus. Tring.

59 (122). *D. hapalina conspectirubra* J. and T. (1922) (pl. xlii, fig. 12 ♂, 13 ♀).

Joicey and Talbot 108, p. 312 (Weyland Mountains).

This insect is one of those so differentiated races that it may be considered almost as a separate species. The ♀ is remarkably different to the ♂, as already mentioned. The subbasal stripe on the hind wing is more developed and longer. The uncus shows a distinct difference (pl. ii, figs. 53, 54).

The difference is greater between this and *h. hapalina* than between it and *tessei*.

(Original description).

"This race approaches *tessei* J. and T. from the Wandammen Mountains, but the distal black area on the fore wing is much more extended.

"♂. Upperside of fore wing with black area reaching to just before the discocellulars. Hind wing as in the other races.

"Underside of fore wing with broader black than in the other races, and the edge of white area only reaching vein 6. Hind wing with the black band thicker than in the type form and less wide than in *tessei*. The postdiscal part of this band not edged with red or only very slightly so, the red spot always present in 1c. The black marginal border reaches to the fold in cellule 3, narrower than in *tessei*. In a few specimens the postdiscal black line is narrower than in the type form, bears no trace of red, and is toothed slightly on the veins distally.

"♀. The upperside as in *tessei*. Hind wing with the black margin a little broader. Underside of fore wing as in *tessei*, in some specimens the white area more or less completely laved with yellow. Hind wing with long subbasal streak, half white and half yellow as in *tessei*. The

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discal patch more or less washed with straw-yellow. The red submarginal line mostly with a narrow and straight costal spot and more curved at vein 5. One specimen has the distal patch on the hind wing sprinkled with orange-red scaling in the cell."

Scent-scale (pl. xxiv, fig. 55). Somewhat spatulate. Moderately short and broad, edge only thickened near the base.

Genitalia :—

Valve (see *h. hapalina*).

Uncus (pl. ii, fig. 54). Similar to the typical form (fig. 53), but the middle lobe smaller, outer lobes less rounded.

Lamina dentata (pl. vii, fig. 56). Distinct from the form found in allied groups. Short and broad, distal ends rounded. The middle of anterior margin incurved, and of the posterior margin sharply excurved. Teeth sparse, strong on the margins, weak on the lobes. Length = *circ.* 1 mm., breadth = *circ.* 0·2 mm. The drawing is a little too broad at the middle.

Habitat.—North Dutch New Guinea (Weyland Mountains) : Menoo River, 3,400—5,000 feet, November—January ; Mount Kunupi, 6,000 feet, November—January, 1920—1921. A series of both sexes taken by the Pratts chiefly on Mount Kunupi. The ♀ is much less common than the ♂.

Types in Hill Museum.

59 (123). **D. HAPALINA TESSEI** J. and T. (1916).

Joicey and Talbot **107**, p. 70, pl. vi, figs. 3 ♂, 4 ♀ (Wandammen Mountains).

This race is closer to *conspectirubra* than to *hapalina*. It may be distinguished from the former by the greater extent of white beyond the cell of the fore wing.

(Original description).

" ♂. Upperside of fore wing with outer black area a little more extended than in *hapalina*, its inner edge not indented in cellule 4.

" Underside : Fore wing with more extended apical black and reduced costal streak ; yellow apical spots larger. Hind wing without yellow on the disc or with only a slight trace ; basal streak yellow at base and white outwardly ; subbasal black bar narrower ; inner black margin extended to vein 2 and forming a short marginal border to middle of cellule 3 ; black discal line widened posteriorly from cellule 4, being widest where it joins the inner marginal black ; the red distal

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border is not curved below vein 2, but invades the black to 1b; inner margin washed with yellow near the base only.

" ♀. Upperside: Fore wing with much more extended black. Hind wing with a broad black outer margin.

" Underside: Fore wing with black outer area as above; basal three-quarters of cell washed with pale yellow. Hind wing with whole inner and outer margin black, leaving red line better defined than in ♂ and narrowly bordered with white distally.

" Length of fore wing: ♂ 30, ♀ 27 mm."

Habitat.—North-east Dutch New Guinea: Wandammen Mountains, 6,000 feet, November, 1914. A small series taken by A., C., and F. Pratt.

Types in Hill Museum.

60 (124). **D. CAMPBELLI** J. and T. (1922).

Joicey and Talbot 108, p. 313 (Weyland Mountains); 110, pl. viii, fig. 3, ♂.

In this species the red postdiscal line of the ♂ does not occupy a submarginal position in the ♀. The black ground-colour extends over all the hind wing with the exception of a white apical patch and sometimes some white dusting in the upper part of cell.

(Original description).

" ♂. Upperside almost as in *hapalina*, the distal black on the fore wing broader apically, and with a straight edge from vein 2 to 6.

" Underside of fore wing with subapical yellow spots as in *hapalina*, and distal black area as on upperside. Hind wing black. A subbasal stripe of lemon colour (iv) larger than in *hapalina*. An apico-costal triangular white patch between vein 6 and the margin, bordered heavily with red on the inner edge. A little distad of the red edging to the white patch is a thin red line from vein 6 to 1b, curved outwards to vein 5, inwards to vein 2, and downwards to 1b.

" ♀. Upperside of fore wing with much broader black, reaching end of cell, or with a little white powdering outside in the cell. Hind wing with broad black outer margin intermixed with white scaling and inner edge nebulous.

" Underside of fore wing as above. Yellow subapical spots as in ♂. Hind wing as in ♂, but the apical white patch reduced on its lower edge, and more or less powdered with black.

" Length of fore wing: ♂ 27 mm., ♀ 28 mm."

Scent-scale (pl. xxiv, fig. 56). Distinct from the preceding species, more resembling species in Group 8. Long and narrow, gradually

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tapering; edges not curved, thickened for about three-fourths. Disc moderately large.

Genitalia :—

Valve (pl. xi, fig. 59). Similar to *hapalina*. Dorsal edge more produced posteriorly. Ventral fold broad and weak. Cavity very small.

Uncus (pl. ii, fig. 55). Type of Group 3. Middle lobe short and triangular. Tegumen sharply excurved below middle lobe, forming a shoulder, thence gently incurved, broadening posteriorly.

Lamina dentata (pl. vii, fig. 55). Short and moderately narrow, distal ends rounded. The unarmed area of the upper and lower margins is as long as one lobe and slightly incurved. Teeth strongly developed, not numerous. Length = *circ.* 0·77 mm., breadth = *circ.* 0·16 mm.

Habitat.—North Dutch New Guinea (Weyland Mountains) : Menoo River, 3,500—5,000 feet, November—January, 1920—1921. Mostly found at 4,000 feet, rare above this. A series of both sexes obtained by the Pratts.

Types in Hill Museum.

61 (125). **D. PHIPPSI** J. and T. (1922).

Joicey and Talbot **108**, p. 315 (Weyland Mountains); **110**, pl. vii, figs. 4 ♂, 5 ♀.

This distinct species is characterized by a short brick-red bar (not spot) sharply defined below the cell on the hind wing. The subbasal hind wing stripe is white, rarely dusted with red.

(Original description).

"♂. Upperside of fore wing with black distal area extending along costa to base, to the discocellulars, to vein 4 before its middle and obliquely to the end of 2. Hind wing with black marginal border about 3 mm. wide, from vein 6 to the inner margin, narrowing anteriorly and posteriorly.

"Underside of fore wing with broader distal black. A subapical lemon-chrome spot divided by vein 8. Hind wing with a snow-white subbasal streak in 7. Below the cell in 1c an oblong spot of nopal red (1) lying in a white band spotted with bluish-grey near the cell and covered with bluish-grey scales on the other side. This band continues from the lower edge of cell as a large discal straw-yellow patch becoming

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broader anteriorly; its edges are clearly defined, the upper one passing beyond vein 6; the lower, straighter, and not quite reaching end of cell, the anterior end bounded by the red submarginal line. Submarginal red line placed more proximal than in *alepa* and reaching the costa; the space between it and the margin from costa to vein 4 is snow-white. Basal edge of wing from costa to middle of inner margin powdered with yellow.

" ♀. Upperside with greatly extended black ground-colour. Fore wing with creamy-white area for two-thirds of inner margin, its outer edge parallel with outer margin, curved round just above vein 3 along inside of cell to base. Hind wing with white proximal half showing the colour of the underside through it, extending to end of cell, posteriorly to basal two-thirds of inner margin, anteriorly following the discal patch of the underside.

" Underside of fore wing with proximal straw-yellow area of same shape and size as on upperside. A subapical line of six lemon-chrome spots only divided by veins. Hind wing as in the ♂.

" Length of fore wing: ♂ ♀ 26 mm."

Scent-scale (pl. xxiv, fig. 57). A spatulate type similar to *conspecti-rubra* but broader and more tapering.

Genitalia :—

Valve (pl. xi, fig. 60). Distal edge with a moderately long and narrow finger-like process directed strongly dorsad. Dorsal edge slightly excurved and posteriorly well-rounded. Ventral fold moderately broad with defined proximal edge. Cavity small.

Uncus (pl. ii, fig. 56). Type of Group 3. Middle lobe short and triangular. Tegumen sharply excurved below middle lobe forming a broad shoulder which is curved inwards, thence sharply incurved and oblique. A much broader type than the preceding species.

Habitat.—North Dutch New Guinea (Weyland Mountains): Menoo Valley and Mount Kunupi, 3,500—6,000 feet, November—January, 1920—1921. A small series of males and three females obtained by the Pratts.

Types in the Hill Museum.

62. D. WEISKEI Ribbe.

This species is distinguished by the orange-coloured proximal area of the fore wing below. Three races are known.

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62 (126). *D. weiskei weiskei* Ribbe (1900).

Ribbe **166**, p. 329 (Aroa River).

Rothschild **179**, p. 314, ♂ ♀.

Fruhstorfer **68**, p. 135, t. 56f.

Delias mirifica Smith and Kirby **203**, Del. ix, figs. 9, 10 ♂.

♂. Upperside of fore wing with white area extended beyond the cell, its edge evenly curved and not reaching the tornus; costa black to the base. Hind wing with black marginal border about 3 mm. wide of even width, edged with black dusting.

Underside of fore wing with bright orange proximal part occupying the same area as the white area above. Cell with a yellow stripe at the base, and inner margin yellow. A curved band of four orange subapical spots, the middle two placed more proximal than the others, the two upper ones much larger than the others.

Hind wing with black ground-colour. A small rounded creamy-white discal patch placed between lower edge of cell and vein 7, its inner edge rounded and passing through middle of cell, its outer edge produced slightly in cellule 5. A submarginal red line somewhat waved, extending from the costa above the discal patch to the submedian, becoming farther from the margin posteriorly. A short red subbasal stripe in 7, edged thinly with white above. A red spot below the cell in 1c. The red submarginal line is more or less bordered with white from the costa to vein 5. Inner margin with only slight yellow dusting.

♀. Fore wing with the white proximal area much reduced and not extended beyond end of cell. Three small white subapical spots, sometimes a fourth spot in 3.

Hind wing with much wider black border than in the ♂, about 8 mm. on vein 4, becoming narrower with nebulous edge below this vein.

Underside as in the ♂.

Length of fore wing: ♂ ♀ 24 mm.

Scent-scale (pl. xxiv, fig. 58). Long and of moderate width, gradually tapering, edges not thickened and but slightly curved.

Genitalia:—

Valve (pl. xi, fig. 61). Distal edge with a short, broad and slightly curved process. Dorsal edge slightly excurved, posteriorly rounded. Ventral fold very broad and very weakly defined.

Uncus (pl. ii, fig. 57). Type of Group 3. Middle lobe narrow longer than in *campbelli*. Tegumen sharply excurved below

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middle lobe, forming a rounded shoulder, thence gently incurved, excurved posteriorly.

Habitat.—South-west British New Guinea: Aroa River. Taken at Owgarra, end of May; also on the Angabunga River, 6,000 feet, November—February. North British New Guinea: Biagi, Mambare River, 5,000 feet, April.

Type of *weiskei* (= *mirifica*) from Aroa, 8,000 feet, in Mus. Tring.

62 (127). *D. weiskei leucias* Jord. (1911).

Jordan **114**, p. 584 (Mount Goliath), ♂.

Rothschild **181**, p. 7 (Snow Mountains).

(Original description).

"♀ A subspecie *D. weiskei weiskei* dicta linea rubra alarum posticarum extus a costa ad marginam abdominalem albo marginata distinguenda.

"The inner edge of the black borders to the upperside of both wings is more sharply defined than in the priority form, the white scaling scarcely invading the black; the borders, moreover, are visibly narrower, and that of the fore wing has centrally a straight inner edge. The red discal line of the hind wing beneath is accompanied for its whole length by a white line, which is about as thick as the red one. This white line, in *D. w. weiskei*, is either restricted to the apical area or from R^1 backwards represented by thin bars."

Habitat.—South Dutch New Guinea: Mount Goliath, 5,000—7,000 feet, February, 1911. Discovered by Meek, who took a small series of ♂ ♂; Snow Mountains, 4,000—6,000 feet, January—February, 1913, three ♂ ♂ taken by the Wollaston Expedition.

Type in Mus. Tring.

62 (128). *D. weiskei huonensis* Talb. (1928).

Talbot **222**, p. 42 (Rawlinson Mountains), ♂.

(Original description).

"♂. More resembles the race of *leucias* from Mount Goliath. Upperside with much broader black margin on fore wing and slightly broader margin on hind wing.

"Underside of fore wing with orange area only reaching to just beyond the cell, its edge here being straight (not curved as in other forms). Hind wing with the light discal patch a little reduced distally, its edge being farther from the margin than in *leucias* and agreeing with this race in the red submarginal line edged with white."

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Habitat.—North-east British New Guinea : Rawlinson Mountains. Described from one ♂ in Mus. Tring.

63 (129). **D. CALLIMA** R. and J. (1905) (pl. lv, fig. 8, ♀).

Rothschild and Jordan, *Nov. Zool.* xii, p. 462 (Angabunga River).
Fruhstorfer 68, p. 131, t. 56 e, ♂.

This species may be recognized by the hind wing below having black ground-colour with reddish-brown markings comprising a postdiscal band and a small discal patch. The ♀ is very different to the ♂ on the upperside. Fore wing with a band of chrome-yellow spots. Hind wing black with a small greenish-yellow proximal area.

(Original description).

" ♂. Palpus, a line behind eye, and the breast greenish-yellow ; upperside of thorax smoky-white, abdomen white.

" Wings, *upperside*, white with a black distal border ; this border extending on fore wing to near upper angle of cell, the costal edge being all black ; on hind wing the border widest in middle, tapering in front and behind, contiguous with an ashy grey band, which is the proximal portion of the black border covered with white scaling.

"Underside.—Fore wing : apical half black, the black colour being more extended than above, entering cell ; a yellow spot just proximally of fork $SC^{4\text{-}5}$, half-moon-shaped, variable in size, often followed by some more yellow dots which are more distal in position. Hind wing : black, with a greenish yellow spot at base ; a subbasal streak behind C, reappearing at apex, and a spot in angle SC^2—R^1, usually with some smaller spots near it, bluish-white, very variable in extent, a patch of whitish-blue scales before middle of abdominal fold ; between this patch and the white subcostal spot there is a rufescent vermilion band ; a second band of the same colour on disc, parallel to distal margin, more or less broken up into half-moons, spots C—SC^2 the largest, the band variable in width, sometimes reduced to a line, which is occasionally widely interrupted.

" ♀. Very different from ♂. Body more extended greenish-yellow.

" Wings, upperside.—Fore wing : black, basal area washed with white and yellowish-green ; a chrome-yellow band on disc extending from SC^1 to M^2, widest in middle, variable in width, last spot rarely absent. Hind wing washed with greenish-yellow from base to apex of cell.

" Underside.—Fore wing : somewhat greyish at base ; base of M

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white, discal band chrome-yellow, much wider than above, with an additional spot situated behind M^2. Hind wing: as in ♂.

"Length of fore wing: ♂ 23 to 28 mm.; ♀ 22 to 26 mm."

Scent-Scale (pl. xxiv, fig. 59). A spatulate type as in *hapalina* and *phippsi*, but with a different texture, more striated than granular. Edges slightly thickened posteriorly. Disc moderately large.

Genitalia:—

Valve (pl. xi, fig. 62). Distal edge produced to a moderately long and finger-like process. Dorsal edge slightly incurved at the middle. Ventral fold broad with proximal edge partly defined. Cavity small.

Uncus (pl. ii, fig. 58). Type of Group 1F. Middle lobe, broad and triangular. Tegumen sharply excurved below middle lobe, forming a broad rounded lobe which is curved inwards thence sharply incurved and becoming broader posteriorly. A broad type.

Habitat.—South-west British New Guinea: Discovered by Meek on the Angabunga River, 6,000 feet and upwards, November—February. Also at Owgarra. North British New Guinea: Biagi, 5,000 feet, February—March.

Types in Mus. Tring.

64 (130) **D. MARGUERITA** J. and T. (1922).

Joicey and Talbot **108**, p. 315 (Weyland Mountains); **110**, pl. viii, fig. 4, ♂.

This is the smallest species in the group. It is distinguished by the hind wing below bearing a red submedian stripe. In most other respects the hind wing pattern resembles *hapalina*. A rather distinct species having affinity with Group 10.

(Original description).

"♂. Upperside almost exactly as in *alepa* Jord., the black marginal line of the hind wing being broader than in *alepa alepa* and just as in *alepa kunupiensis*.

"Underside of fore-wing as in *alepa alepa* except that the subapical spots are much larger in cellules 4 and 5. Hind wing with the red subbasal stripe shortened distally and the space between it and vein 8 filled in by a white stripe reaching to just before the end of vein 8. The red stripe is not of the same red tone as in *alepa*, but is nopal red (1). There is a narrower stripe of the same colour in 1c from below cell at base to the postdiscal line, and partly represented in *phippsi* by

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an oblong spot. Cellule 1b is filled in with pale olive-grey (1) from base to marginal line, and 1a is ecru-olive (xxx). The outer edge of the red stripe is narrowly edged with black to a variable degree, the red scales overlaying a black ground. At the distal end of the stripe this black scaling becomes broader and bends at right angles to form a postdiscal line, which is nearest the cell on vein 3 and does not generally reach vein 4. This line varies in width, becomes thinner anteriorly and in one specimen reaches vein 5 by a distal curve. The outer edge of the postdiscal band is bordered with red which continues as a thin submarginal line from vein 4 to just before vein 7, being parallel to the margin from below vein 5 to its termination. The basal area between lower edge of cell and middle of costa and discally to vein 7 is black; this area is continuous with the black scaling in 1c, and postdiscal band. Discal area of wing within postdiscal band laved with straw-yellow. A marginal black border as on the upperside.

" Length of fore wing: 23 mm."

Scent-scale (pl. xxv, fig. 60). A distinct type of this group. Long and narrow, gradually tapering. Texture not granulate. Central core long and apparently of even width. Disc relatively small.

Genitalia:—

Valve (pl. xi, fig. 63). Distal edge produced to a long finger-like process which is narrow and of even width. Dorsal edge slightly excurved, posteriorly straight. Ventral fold narrow, its proximal edge partly defined. Cavity not seen.

Uncus (pl. ii, fig. 59). Type of Group 1F. Middle lobe rather short and broad. Tegumen sharply excurved below middle lobe, forming a broad rounded lobe which is curved inward, thence gently incurved, becoming broader posteriorly. Anteriorly less broad than in *callima*.

Habitat.—North Dutch New Guinea (Weyland Mountains): Menoo River, 4,000 feet, December—January. Described from twelve ♂♂ taken by the Pratts at one spot within a few days.

Types in Hill Museum.

GROUP 10.

Species of small to moderate size occurring only in the mountains of New Guinea. The wing pattern is similar to Group 9. The underside of the hind wing has a red subbasal stripe and a red submarginal line, with a black and white or black and yellow ground-colour. The species *bothwelli* is very distinct in pattern (see Key).

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The scent-scale is similar to Groups 8 and 9. There are two types, one narrow and triangular (*kummeri, bothwelli, dixeyi*), the other posteriorly rounded and flask-shaped. The disc is of moderate size.

The valve resembles Group 9. The apical process is stout and of moderate length, not much curved.

The uncus (pls. ii and iii) shows a characteristic type, not, however, entirely peculiar to this group of species. It belongs to Group 1B and 1C and is therefore more homogeneous than in the related species-groups.

With Groups 8, 9 and 10 we have dealt with a related assemblage of peculiar species and have endeavoured to arrange them according to their peculiarities of pattern or structure.

It seems that a number of forms must await discovery to afford a clue to the real relationship of the ones here discussed.

We have assigned six species to Group 10, and these are divided into eleven races.

Key to Species

1.	Hind wing below without a red spot below the cell	6
	Hind wing below with a red spot below the cell	2
2.	Hind wing below with a red submarginal line	3
3.	Hind wing below with a submarginal line complete, or if interrupted, at least with vestiges above vein 6	4
	Hind wing with red submarginal line only reaching vein 6	5
	Hind wing below with the submarginal line only present posteriorly, reaching vein 4	*kummeri*
4.	Hind wing below with white marginal border not reaching vein 2 ...	*ligata*
	Hind wing below with white marginal border extended narrowly to end of red submarginal line	*isocharis*
5.	Hind wing below with a cream-coloured anterior patch	*alepa*
6.	Hind wing below with a red subbasal spot	*dixeyi*
	Hind wing below with a white or cream subbasal stripe	*bothwelli*

65. D. KUMMERI Ribbe.

This species is distinguished by the red submarginal line not being extended over the white area of the wing. The species is divided into two races and has a general distribution over New Guinea though nowhere common.

Length of fore wing, ♂ 21—27 mm.

65 (131). *D. kummeri kummeri* Ribbe (1900) (pl. lv, fig. 7, ♂).

Delias kummeri Ribbe **166**, p. 308 (Aroa River); **167**, p. 340, t. 8, fig. 4 ♂; Smith and Kirby **203**, Del. viii, figs. 5, 6 ♂, p. 29; **Roths.**, **178**, p. 313 ♀.

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♂. Upperside white. Fore wing with black outer area extended along the costa to base and not quite reaching end of cell. Hind wing with the margin finely edged with black.

Underside of fore wing with black and white areas as above. A narrow subapical band of four ochre-yellow spots, the one in cellule 6 larger than the others. Hind wing with a sharply defined large chalky-white area extending from the margin between middle of cellule 3 and vein 7 to beyond middle of cell, proximally narrowed and rounded, its inner edge crossing the points of origin of veins 7 and 2, its lower edge passing slightly below the cell in area 2. A short red submarginal line removed from the margin, extending from the lower edge of the white area in 3 to the first submedian. A short red costal bar placed near the apex. A short red subbasal stripe in cellule 7. A red spot below the cell. Some slight yellow scaling at the base of costa and on the basal area of the inner margin.

♀. Similar to the ♂, "Except in the more extended black distal borders of the upperside and the slightly shorter fore wing." (Rothschild 178, l.c.)

Scent-scale (pl. xxv, fig. 61). Moderately narrow and triangular, not densely granular, edges not much thickened.

Genitalia:—

Valve (pl. xi, fig. 64). Apical process moderately long and narrow. Dorsal edge nearly straight, posteriorly slightly rounded. Ventral fold narrow and more sclerotized posteriorly. Cavity of moderate size.

Uncus (pl. ii, fig. 60). Type of Group 1B. Lobes short, middle one triangular, outer ones broad and slightly curved inwards, scarcely shorter than the middle one. Tegumen gently incurved, becoming broader posteriorly. A long narrow type.

Pupa.—There is an empty pupa-case in the Tring Museum, found by Meek on the Aroa River in February. We figure this on plate liii, fig. 5.

Habitat.—South-west British New Guinea: Aroa River, January—March; Owgarra, end of May; Angabunga River, 6,000 feet, November—February.

North British New Guinea: Biagi, 5,000 feet, January—April; Hydrographer Mountains, February—May.

North-east British New Guinea: Rawlinson Mountains.

Type ♂ in the Tring Museum from Aroa. There is also a ♂ with yellow instead of red markings on the hind wing below from Biagi,

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5,000 feet, March, and a ♂ with these markings pink, also from Biagi. A few females, discovered by Meek, are in the Tring Museum. The male is not common in collections.

65 (132). *D. kummeri similis* Talb. (1928).

D. kummeri f. similis Talb. **223**, p. 177 (1928) (Arfak).

D. kummeri Roths. **181**, p. 7 (Snow Mountains).

♂. A slightly differentiated race in which the white area of the fore wing is more extended distad than in the typical form.

Habitat.—North-east Dutch New Guinea: Arfak Mountains, 6,000 feet, January—February (type); Ninay Valley, November—December, 1908, A. E. Pratt, 1 ♂ in Coll. Adams (Mus. Brit.).

North Dutch New Guinea: Weyland Mountains, Menoo River, 3,500—5,000 feet, December—January, also in June.

South Dutch New Guinea: Snow Mountains, Carstenz Peak, 5,000—10,000 feet, February—March (Mus. Tring).

Type in Hill Museum from the Arfak.

66. **D. LIGATA** Roths.

This species occurs with *kummeri* and was considered to be a form of this. The only real pattern difference between them is in the red submarginal line of the hind wing which in *ligata* is continuous, and if broken, there remain vestiges. But in the Arfak the two species differ in other respects, *kummeri* approaching *ligata* from the Weyland Mountains, and *ligata* approximating to its British New Guinea form. Structural differences are to be found in the form of the scent-scale and valve. In *ligata* the apical process of the valve and the ventral fold are broader than in *kummeri*. The scent-scale of *ligata* is more spatulate and posteriorly rounded, a difference easily apparent in the figures on pl. xxv, figs. 61, 62. We have not found intermediates between these types of scale. A slight difference is also found in the lobes of the uncus, the outer lobes being larger in *kummeri*.

Some specimens of *ligata* have the red line on the hind wing interrupted as in *kummeri*, but always with specks of red scaling in the interspace. This variation pointed to a transition to *kummeri*. One may be easily misled by such apparent transitions, and an examination of the scales proved these specimens to belong definitely to *ligata*. We have not seen any *kummeri* with traces of the red line

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beyond its normal extent. This species is generally distributed in three races and is much commoner than *kummeri*.

Length of fore wing, ♂ 24—29 mm., ♀ 23—27 mm.

66 (133). *D. ligata ligata* Roths. (1904).

D. kummeri f. ligata Rothschild **178**, p. 313, pl. ii, fig. 20 ♂ (1904) (Aroa River) ♂ ♀ ; Fruhst., Seitz' *Macrolep.* ix, p. 135, t. 56f. (1910).

♂ ♀. Upperside as in *kummeri kummeri*. Fore wing below with the yellow subapical spots smaller. Hind wing with a heavy red submarginal line proximally edged with black (more so in the ♀), and extending from the red costal spot to the submedian, in other respects the pattern as in *kummeri*.

Scent-scale (see *weylandensis*).

Genitalia:—

Valve (see *dealbata*).

Uncus (pl. iii, fig. 61). Type of Group 1B. Lobes short, middle one triangular, outer ones shorter and broader, directed inwards. Tegumen gently incurved. A long narrow type.

Habitat.—South-West British New Guinea: Aroa River, February—March; Angabunga River, 6,000 feet, November—February.

North British New Guinea: Mambare River, Biagi, 5,000 feet. January—April; Hydrographer Mountains, 2,500 feet, January—May,

North East British New Guinea: Rawlinson Mountains.

Types from the Upper Aroa River, in the Tring Museum.

66 (134). *D. ligata weylandensis* J. & T. (1922).

Joicey and Talbot **108**, p. 311 (Weyland Mountains) ♂ ♀.

(Original description).

" ♂. Upperside of fore wing with narrower black distal area than in the type form.

" Underside of fore wing with distal black as above. Hind wing with white discal area extended into cellule 2 and to a greater extent in cellule 3 than in the type form, and as much as in *kummeri*.

" ♀. Upperside of fore wing mostly with narrow distal black area. Underside of fore wing with white area extending into cellule 4.

" Ab. 1. Hind wing below with red submarginal line broken on vein 4. Six ♂ ♂, three ♀ ♀.

" Ab. 2. Red submarginal line very thin and without black edging. One ♂.

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"Ab. 3. The red submarginal line between veins 4 and 7 represented by some scattered red scales. Two ♂ ♂, one ♀.

"Ab. 4. The red submarginal line between 4 and 7 entirely absent. One ♂."

Scent-Scale (pl. xxv, fig. 62). Flask-shaped, rounded posteriorly and this area with thickened edges.

Lamina dentata.—Small and narrow. Teeth strong, not present on the distal edges. Anterior margin incurved. Length = *circ.* 1 mm., breadth = *circ.* 2 mm.

Habitat.—North Dutch New Guinea: Weyland Mountains, Menoo River, 3,500—5,000 feet, November—January; Mount Kunupi, 6,000 feet, December—January. A series of both sexes was obtained by Pratt Bros.

Types in the Hill Museum.

66 (135). *D. ligata dealbata* Talb. (1928).

Talbot 222, p. 44 (Arfak Mountains) ♂ ♀.

D. ligata Kenrick 116, p. 178, ♀.

(Original description).

"♂. Upperside and fore wing below as in *ligata* from British New Guinea. Hind wing with the white area not reaching beyond vein 2, rarely slightly extended beyond that vein; reduced posteriorly, not extending into cellule 2, and forming a smaller patch in cellule 3.

"♀ above with less sharply defined black borders on the hind wing, mostly with only a black dusting. Underside as in the ♂, but fore wing with sometimes some yellow discal suffusion. Hind wing with the red line more narrowly edged with black anteriorly."

Genitalia:—

Valve (pl. xii, fig. 65). Apical process moderately long and broad. Dorsal edge nearly straight, posteriorly rounded. Ventral fold broad. Cavity not seen.

Habitat.—North-east Dutch New Guinea: Angi Lakes, Arfak Mountains, 6,000 feet, March, 1914; Warmasin, 6,000 feet, March, 1910. A series of ♂ ♂ and 6 ♀ ♀ (including types) in Hill Museum.

67. **D. ISOCHARIS** R. and J.

This species is very similar to the preceding two but is to be easily distinguished. On the hind wing below the white area is extended

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from the margin along the outer edge of the red submarginal line as far as its end on the submedian.

The scent-scale is very similar to that of *ligata* and *alepa* but is shorter. The uncus is a much broader type than in the allied species.

Length of fore wing, ♂ 21—26 mm., ♀ 20—23 mm.

The species has not been found in the Arfak, nor in the Wandammen Mountains, but is divided into two races. The ♂ is moderately common.

67 (136). *D. isocharis isocharis* R. and J. (1907) (pl. xlii, fig. 14 ♀, 15 ♂).

Rothschild and Jordan **185**, p. 191 (Mambare River); Roths. **181**, p. 7 (Snow Mountains).

♂. Upperside as in *ligata*. Fore wing below as in *ligata ligata*, the white area rarely extending above vein 4, but the subapical yellow spots large and usually only three are present. Hind wing as in *ligata*, the white area extending more or less into cellule 2. The white area extending as a thin line bordering the outer edge of the red line from vein 3 to the submedian. This latter character is really the distinctive character of this species.

♀. Upperside very similar to the ♀ of *ligata* forms. Underside as in the ♂.

Scent-scale (see *latiapicalis*).

Genitalia:—

Valve (pl. xii, fig. 66). A short and broad apical process, posteriorly incurved. Dorsal edge nearly straight, posteriorly rounded. Ventral fold broad with well-defined proximal edge. Cavity small.

Uncus (see *latiapicalis*).

Lamina dentata (see *latiapicalis*).

Habitat.—North British New Guinea: Mambare River, Biagi, 5,000 feet, January—April; Hydrographer Mountains, February.

North-east British New Guinea: Rawlinson Mountains.

South-west British New Guinea: Upper Aroa River; Angabunga River, 6,000 feet, November—February.

South Dutch New Guinea: Snow Mountains, 4,000—6,000 feet, January—February, 1913.

Types from Biagi, in the Tring Museum.

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67 (137). *D. isocharis latiapicalis* J. and T. (1922).

Joicey and Talbot, **108**, p. 310 (Weyland Mountains), ♂ ♀.

(Original description).

"Distinguished by the narrow black distal border of the fore wing.

"♂. Upperside of fore wing with black distal area much narrower than in the type form and more as in *ligata*; its edge is straight and oblique to the margin. Hind wing as in the type form.

"Underside of fore wing as above, edge of distal black more distinctly rounded, subapical yellow spots larger and forming a band from costa to vein 4, or the spot in 4 small. Hind wing with inner marginal black reduced between veins 2 and 4 and not always extended as an edging to the red submarginal line. The black border reaching middle of cellule 3 as in type form, but in many specimens this is reduced in cellule 2.

"♀. Upperside of fore wing with narrower black area than in type form. Hind wing with marginal black a little narrower than in type form and with the same tendency to increased black scaling at the apex. Five out of the six specimens have a yellowish tint.

"Underside of fore wing with distal black as above. Discal area more or less laved with straw-yellow. Hind wing as in ♂."

The posterior extension of the white area of the hind wing is wider than in the typical form, but its width (below vein 4) is very variable and sometimes forms a definite transitional stage to the pattern of *hapalina*, though of course these species are really wide apart.

Scent-scale (pl. xxv, fig. 63). Very similar to *ligata* but shorter and less rounded posteriorly.

Genitalia:—

Uncus (pl. iii, fig. 62). Type of Group 1B. Middle lobe short and narrow, outer lobes longer and rather broad, curved slightly inward. Tegumen gently incurved, excurved posteriorly.

Lamina dentata (pl. vii, fig. 54). Short and narrow, distal ends rounded. The unarmed middle of anterior margin incurved with a projection at the centre; unarmed middle of posterior margin narrower and excurved. Teeth well developed, but leaving a large central area unarmed.

Habitat.—North Dutch New Guinea: Weyland Mountains, Menoo River, 3,500—5,000 feet, November—January; Mount Kunupi, 6,000 feet. Described from a series of ♂ ♂ and 6 ♀ ♀ taken by Pratt Bros.

Types in Hill Museum.

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68. **D. ALEPA** Jord.

In this and the two following species the red submarginal line of the hind wing does not reach the costa. In *alepa* the black area is increased leaving an anterior white patch which is more or less pale buff-coloured. This species is very distinct from the others already dealt with in the group. Apart from other points the scent-scale is much longer and more like the scale of *dixeyi* and *bothwelli*. The species is less common than *isocharis*.

Length of fore wing, ♂ 20—25 mm., ♀ 23—24 mm.

68 (138). *D. alepa alepa* Jord. (1911).

Jordan **114**, p. 585 (Mount Goliath) ♂; Rothschild **181**, p. 7 (Snow Mountains).

(Original description).

" ♂. Speciei *D. kummeri* dictae similis, sed limbo nigro alarum anticarum multo angustiore, area alba paginae inferioris alarum posticarum multo minore atque flavescente.

" Smaller than *kummeri* Ribbe (1900), and the apex of the fore wing more rounded. The black border of the fore wing measures 5 mm. at R^1, being at this vein only as wide as the interspace which separates it from the apex of the cell, and does not quite extend to the fork at SC^5 and R^1; the border gradually narrows posteriorly, its inner margin from the subcostal fork to the hind angle being first nearly straight and then almost evenly rounded. The border of the hind wing is very little wider than in *D. w. weiskei* with the exception of the anal portion, which is thinner. The black area on the underside of the hind wing invades the apex of the cell and extends forward beyond R^2. The white area, which is shaded with buff excepting its edges, is therefore much smaller than in *D. kummeri*; it has a subovate or subtriangular shape, and reaches from the costal margin across the cell to the median vein, and outwardly to near the tip of R^1. The red discal line is thin, and stops short at the white patch, reaching a little beyond R^2. The red basal and postcellular spots are as in *kummeri*.

" A small series of ♂ ♂ from Mount Goliath."

Habitat.—South Dutch New Guinea: Mount Goliath, 5,000—7,000 feet, February, 1911; Snow Mountains, 4,000—6,000 feet, January—February, 1913.

Discovered by Meek. The ♀ of this race is unknown.

Type in the Tring Museum.

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68 (139). *D. alepa kunupiensis* J. and T. (1922) (pl. xlii, fig. 16).

Joicey and Talbot, **108**, p. 314 (Weyland Mountains) ♂ ♀.

(Original description).

" Distinguished by its broader black margins.

" ♂ Upperside of fore wing with broader black margins, filling in the base of cellule 6 or sometimes a white dot here. Hind wing with a heavier black margin than in the type form.

" Underside of fore wing with relative black and white areas as above. Hind wing with the red line produced farther beyond vein 5, and in some cases reaching 6, the black area produced farther beyond 6.

" ♀. Upperside of fore wing with black margins broader than in the ♂, more so below vein 4; one or two subapical white spots. Hind wing with much broader margins than in ♂, but less so than in *weiskei weiskei* Ribbe.

" Underside of fore wing with black margins little broader than in ♂. Hind wing as in the ♂, the black area not always invading the cell."

Scent-scale (pl. xxv, fig. 64). Longer than the scale of the preceding species in this group, and less rounded posteriorly than in *isocharis*, etc.

Genitalia :—

Valve (pl. xii, fig. 67). Apical process curved dorsad, moderately long and broad. Dorsal edge incurved slightly at the middle, posteriorly rounded. Ventral fold weak and only developed posteriorly. Cavity not seen.

Uncus (pl. iii, fig. 63). Type of Group 1c. Lobes equal in length, middle one with apex slightly curved inwards, triangular. Tegumen strongly incurved. A broad type.

Lamina dentata (pl. vii, fig. 45). Short and broad, distal ends oblique. The middle of anterior and posterior margins incurved. Teeth strongly developed and numerous. Length = *circ.* 0·8 mm., breadth = *circ.* 0·13 mm.

Habitat.—North Dutch New Guinea: Weyland Mountains, Mount Kunupi, 6,000 feet, November—January; Menoo River, 3,500—8,000 feet, November—January. Discovered by Pratt Bros., who took a series of ♂ ♂ and a small series of ♀ ♀.

Types from Mount Kunupi, in the Hill Museum. We figure the holotype.

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69 (140). **D. DIXEYI** Kenr. (1909) (pl. xlii, fig. 17 ♀, 18 ♂).

Kenrick **116**, p. 179, pl. vi, fig. 5 ♂ (Arfak); Joicey and Noakes, **105**, p. 61, pl. vi, fig. 5 ♀.

This species, as well as the next, may be distinguished from others in the group by the absence of the red spot below the cell on the hind wing. It is at once distinguished from *bothwelli* by the presence of the red subbasal spot and by a silvery-white marginal border from the costa to cellule 3.

Only known from the Arfak, where it is rare.

♂. Upperside of fore wing with broader black area than in *kunupiensis*, and likewise the black margin of hind wing is much wider between the apex and vein 4.

Underside of fore wing with black area as above and the costal black entering the cell. The yellow subapical spots are well developed very much as in *isocharis*.

Hind wing with a red subbasal spot, a red submarginal line, and a buff-coloured area as in *alepa*, but no red spot below the cell. The buff area is more extended than in *alepa*, reaching well into cellules 2 and 3 but not extended below the cell behind vein 2. The submarginal line is thicker than in *alepa* and extends above vein 6; it is narrowly separated from the buff area below veins 6 and 4. Marginal area between the red line and the margin silvery-white from the costa to middle of cellule 3, extending further as a fine edging to the red line as far as the submedian.

♀. Resembles *alepa* above but has much wider black margins. Below it resembles the ♂.

Length of fore wing, ♂ 22—26 mm., ♀ 24 mm.

Scent-scale (pl. xxv, fig. 67). A little longer and narrower than in *alepa*, triangular and not rounded posteriorly.

Genitalia:—

Valve (pl. xii, fig. 68). Apical process long and narrow. Dorsal edge nearly straight, posteriorly rounded. Ventral fold not broad, with weak proximal edge. Cavity small.

Uncus (pl. iii, fig. 64). Type of Group 1B. Lobes short and of about equal length, middle one triangular, outer one directed inwards. Tegumen gently incurved. A narrow type.

Habitat.—North-east Dutch New Guinea: Arfak Mountains, Warmasin, 6,000 feet, November—December; Angi Lakes, 6,000 feet, January—March. Discovered by A. E. Pratt.

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Type ♂ in British Museum (presented by Sir G. H. Kenrick); ♀ neallotype in Hill Museum.

70 (141). **D. BOTHWELLI** Kenr. (1909) (pl. xlii, fig. 19 ♂, 20 ♀).

Kenrick **116**, p. 179, pl. vi, fig. 6 (Arfak) ♂; Joicey and Noakes **105**, p. 62, pl. vi, fig. 6 ♀.

This peculiar species is an outlier of the group. The hind wing pattern has become still further modified. The buff-coloured area is spread over the wing and extends also to the subbasal stripe which is of this colour. The red line is heavier but more reduced in length.

The insect is not more plentiful than *dixeyi* and, like it, is known only from the Arfak. The ♀ is very rare.

♂. Upperside of fore wing with still further reduced white area which does not extend beyond end of cell and sometimes scarcely above vein 3. Hind wing with black border as in *dixeyi* between costa and vein 3, not sharply defined but with bluish-grey proximal scaling, especially posteriorly.

Underside of fore wing with white area sometimes reaching beyond the cell, a heavy black costal border, and yellow subapical spots as in *dixeyi*.

Hind wing pale buff with the distal margin narrowly edged with black. Subbasal stripe pale buff, wider and longer than the red spot of the preceding species. Submarginal red line heavier than in the preceding species and strongly edged with black proximally, not extended above vein 5. This line is bordered distally by silvery-white. Inner margin to the first submedian deep yellow, likewise base of cell and costa.

♀. Upperside with much broader black areas. Fore wing with small and somewhat ovate creamy-white patch not reaching the base. Two white subapical dots. Hind wing border well defined from costa to vein 3, where it is 5 mm. wide, and below this vein the border is grey and still wider.

Underside as in the ♂ except for extended black on the fore wing.

Length of fore wing, ♂ 22—24 mm., ♀ 21·5 mm.

Scent-scale (pl. xxv, fig. 66). Much longer than in *dixeyi* and less strongly tapering, otherwise of similar shape, but denser in texture.

Genitalia:—

Valve (pl. xii, fig. 69). Apical process short and moderately broad. Dorsal edge slightly rounded, more so posteriorly.

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Ventral fold not broad, proximal edge only defined posteriorly. Cavity with large flap.

Uncus (pl. iii, fig. 65). Type of Group 1B. Middle lobe narrow, longer than the others. Outer lobes broad and rounded. Tegumen strongly incurved, and oblique with straight sides.

Habitat.—North-east Dutch New Guinea: Arfak Mountains, Warmasin, 6,000 feet, November—December; Angi Lakes, 6,000 feet, January—March, 1914. Discovered by A. E. Pratt and described from a single ♂. A small series was taken by the Pratts.

Type from Warmasin in the British Museum (presented by Sir G. H. Kenrick). The only known ♀ is the neallotype in Hill Museum.

GROUP 11.

A homogeneous group of large-winged species quite distinct from other groups. It contains nine species (comprising thirteen races) which range from the Moluccas to New Guinea, Australia, and the Bismarck Islands.

All the species have a red subcostal stripe on the hind wing below, also usually a red submarginal line which is sometimes absent, in which case the wing is black.

The form of the scent-scale (pls. xxv—xxvi) is characteristic. It is small and definitely flask-shaped, with a rather small accessory disc. In shape this approximates to *Piccarda* which, however, have rather large discs. Details are well shown in *prouti* (fig. 74).

The uncus (pl. iii) is also characteristic of this group with the exception that a divergence is found in *funerea*, this having lost the small process on the outer lobes.

This group cannot find a place in any linear system and is not directly related to either the group of *kummeri* or of *belladonna*. It was probably given off from the *Piccarda* stem. We have made it the last of the groups whose scent-scale bears a relatively small disc, a character found also to some extent in the following *belladonna* group.

It is to be noted that the species *wollastoni* is placed here provisionally, as we have made no structural examination of the unique type.

Key to Species (♂).

1. Hind wing below without a red submarginal line ... 2
   Hind wing below with a red submarginal line 4
2. Fore wing above entirely white ... ... *dohertyi*
   Fore wing above with black distal area 3

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3.	Fore wing below with cell brick-red	*eximia*
	Fore wing below with cell white	*ornytion persephone*
4.	Fore wing above blue-grey	*joiceyi*
	Fore wing above white	5
5.	Fore wing above without black distal area	6
	Fore wing above with black distal area	7
6.	Hind wing below brownish black	*funerea*
	Hind wing below mostly yellow	*prouti*
7.	Hind wing below black, without grey or yellow markings	*ornytion* (other races)
	Hind wing below black, with grey, red or yellow markings	8
8.	Hind wing below with a red discal spot	*wollastoni*
	Hind wing below without a red discal spot	9
9.	Hind wing below with a grey submarginal band... ...	*nigrina*
	Hind wing below mostly red behind the submarginal line ...	*duris*

71. **D. JOICEYI** Talb. (1920) (pl. lv, figs. 9 ♂, 10 ♀).

Talbot **221**, p. 400, pl. xvii, figs. 6, 7 ♂, 8 ♀, pl. xviii, figs. 9—12 (Cent. Ceram).

A very distinct species, remarkable for the strange bluish grey colour of the ♂ above, and for the presence of a red band on the ♀ fore wing above, a character not found in any other species.

The insect was one of the several discoveries made by the brothers Pratt on the Manusela range in Central Ceram. The sexes were not usually taken together, the ♂ ♂ flying at 5,000 feet and the ♀ ♀ at 6,000 feet. Very few ♂ ♂ were in good condition and were much harder to capture than the ♀ ♀.

The red band of the female is strikingly visible on the wing and must serve as a warning pattern.

The collectors were fortunate in finding the pupa-cases. These show affinity to the pupae of *duris* and *nigrina*.

♂. Upperside bluish grey, hind wing slightly darker, margins (except inner margin of fore and hind) finely edged with black, fringes black on inner margin of fore wing.

Underside of fore wing black, inner margin grey-white with a streak of similar colour in the cell and in the submedian area. A patch of greenish yellow hair in base of cell, extending along its upper margin to the middle. A band of five yellow subapical spots, somewhat lunulate, the anterior two the larger, extending from cellule 8—3.

Hind wing with black ground-colour. A long vermilion-red subcostal stripe. A similarly coloured postdiscal line, rather irregular and interrupted at veins 2 and 3. This line is heavy and composed of six

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curved bars with an additional one in base of cellule 3, either as a bar or a squarish spot ; the posterior bar is placed below the one above and is directed to the anal angle. This postdiscal band lies within the black ground-colour, of which there is a broad band which enters the cell end. A grey-white discal band extends from vein 6 to the submedian fold ; its outer edge sharply defined, is curved outward from vein 6 and inward from vein 5, crossing the cell near its end ; its proximal edge is merged into a greenish yellow proximal area which extends over the inner margin and half the cell into the base of cellule 5. A marginal yellow band, coloured as the inner margin, extends from the apex to the anal angle, and is traversed by the black veins; the inner edge of this border is nebulous ; the outer edge is finely margined with black.

Abdomen bluish grey above, grey-white below. Hair of femora and pectus and palpi greenish yellow mixed with fuscous.

♀. Upperside black with the basal areas of both wings powdered with yellow. Fore wing with an oblique band of wedge-shaped brick-red spots (in some cases pale orange) placed submarginally, five to seven in number, separated only by the veins. These spots, with their narrow ends directed proximad, are less sharply defined distally with their outer edge more or less toothed ; the two anterior spots are placed more proximal than the others, and the spots below vein 3 (if any) are smaller than the others and placed near the margin. Hind wing with the inner area grey-white, merged basally into the yellow powdering.

Underside of fore wing with band as above but orange-red. Proximal area of cell greenish yellow. Hind wing as in the male.

Abdomen dorsally black powdered with greenish yellow, laterally grey-white, ventrally greenish yellow.

Length of fore wing, ♂ 32—39 mm., ♀ 31—38 mm.

Pupa (pl. liii, fig. 8). The following is a description made from two pupa-cases sent by Messrs. Pratt.

Straw-coloured with black spines. Head process small, strongly bifurcate, measuring across the fork 3 mm. Base of head with two short and stout processes. Extreme basal segment of abdomen with a short blunt spine placed laterally, segment 2 with a longer and curved spine placed laterally and anteriorly, segment 3 with two similar spines, one basally and one anteriorly, so that there are four lateral spines on either side. Dorsal line of abdomen bears six similar spines, one on each of the basal part of segment 2—7. Length from tail to fork of head 29 mm. The collector notes for one of the pupa-cases that it was

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found attached to the upper side of a twig about five feet from the ground, February 5, 1920, at 4,600 feet.

Scent-scale (pl. xxv, fig. 65). Resembles *prouti* and differs from all the others in the group by being much longer and narrower.

Genitalia:—

Valve (pl. xii, fig. 70). Apical process long, narrow and finger-like. Dorsal edge nearly straight, posteriorly rounded. Ventral fold of moderate width. Cavity not seen.

Uncus (pl. iii, fig 66). Type of Group 1D. Middle lobe long, narrow and triangular. Outer lobes broad and rounded. Tegumen sharply incurved and oblique.

Lamina dentata (pl. vii, fig. 37). Long with broad lobes, distal ends rounded. Central area wide and not constricted, margins excurved. Teeth very strong on the margins, weak on the lobes. Length = *circ.* 1·25 mm., breadth = *circ.* 0·25 mm.

Habitat.—Central Ceram: Mount Manusela, 4,600—6,000 feet, October and November, 1919, and January, 1920. A series of both sexes.

We figure the types which are in the Hill Museum.

72. D. ORNYTION G. and S.

This species is distinguished by the hind wing below being black with the red subcostal stripe of the group, and with or without a red submarginal line and no other markings.

The insect is fairly plentiful over New Guinea and Waigeu at various elevations from sea-level to 4,000 feet. It enters into mimetic association with *Huphina abnormis* and has even been classed as a *Huphina*. There are three races.

Length of fore wing, ♂ 26—35 mm., ♀ 29—36 mm.

72 (143). *D. ornytion persephone* Stgr. (1894) (pl. xliii, fig. 2 ♀).

Staudinger **213**, p. 355 (Waigeu) ♂.

Huphina persephone Fruhstorfer **68**, p. 147, t. 63d.

♂. Upperside white. Fore wing with broad black apical area which reaches sometimes to the cell; its outer edge extends below vein 2 to the outer margin. Hind wing with a slight grey tinge; outer margin narrowly edged with black.

Underside of fore wing as above, costa black. Hind wing black; no submarginal line, costa yellow at the base, a brick-red subbasal stripe.

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Abdomen white. Hair on pectus and femora bright yellow.

♀. Upperside of fore wing with grey-white proximal area which does not reach end of cell nor often extends into cellule 3. Hind wing with grey proximal area extending beyond the cell, the black distal area being very broad anteriorly and narrowing to the anal angle.

Underside as in the ♂. Abdomen yellow on the ventral surface, pectus deeper yellow.

Scent-scale (pl. xxv, fig. 68). Short and flask-shaped, typical of the group.

Genitalia:—

Uncus (pl. iii, fig. 73). Type of Group 1D. Middle lobe long and triangular, outer ones broad. Tegumen strongly incurved. A broad type.

Lamina dentata (pl. vii, fig. 57). Small, short and narrow, distal ends oblique. Middle of anterior margin incurved, of the posterior margin strongly excurved. Teeth strong on the margin, weak on the lobes. Length = *circ.* 0·77 mm., breadth = *circ.* 0·13 mm.

Habitat.—Waigeu, March—May, 1915. Pratt Bros. took a good series of ♂ ♂ and about half the number of ♀ ♀.

North-east Dutch New Guinea: Mount Misresi, Arfak, 3,000 feet, January; Momi, Arfak, 3,500—4,000 feet, March; coast near Manokwari, January—February. Was not taken at the Angi Lakes, the elevation too high.

West Dutch New Guinea: Kapaur, December—January.

North Dutch New Guinea: Weyland Mountains, at Nomnagihé, 25 miles south of Wangaar, 2,000 feet, January—February, 1921; rarely on Mount Kunupi, 6,000 feet, November—December, 1920. Taken by Pratt Bros.

South Dutch New Guinea: Oetakwa River, up to 3,500 feet, September, October, December (Meek).

Type in Mus. Berlin from Waigeu. The ♀ was not described at the time. The neallotype is the ♀ in coll. Fruhstorfer, bearing the label *odyssia*, a name *in litt.*, described and figured as *persephone* in Seitz.

Variation.—Two ♂ ♂ from Waigeu show a vestigial red submarginal line on the hind wing with a slightly paler marginal area. The fore wing below has often three or four yellow subapical spots, variable in size and frequently absent.

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72 (144). *D. ornytion ornytion* G. & S. (1880) (pl. xliii, fig. 1 ♂).

Pieris ornytion, Godman and Salvin **77**, p. 613, pl. lvi, fig. 5 ♂ (Port Moresby); Mitis **137**, p. 104; Butl. **14**, p. 154 (" Not a Delias, erroneously referred to this genus by Von Mitis "!); Roths. **178**, p. 312 (= *katharina* Ribbe); Röber **170**.

Huphina abnormis ornythion, Fruhst. **68**, p. 147.

Delias katharina, Ribbe, **166**, p. 308.

Scent-scale.—Dixey, *Proc. Ent. Soc. Lond.* 1909, p. cxiii.

Mimicry.—Dixey, *Trans. Ent. Soc. Lond.* 1918, pp. 123, etc.

The species was not included by Butler in his list, and Fruhstorfer was apparently led astray by Butler's remarks quoted above, yet Fruhstorfer had a specimen and failed to examine it.

♂. Upperside as in *persephone*. Underside of hind wing with a thin red submarginal line which sometimes disappears posteriorly; it starts from a small red spot on the costa, and reaches the submedian at a point farther from the margin than it is anteriorly.

♀. Upperside with white proximal areas which are more sharply defined than in *persephone* and more extended. Underside as in the ♂, but the red line on hind wing more strongly developed, as also the, yellow subapical spot of the fore wing.

Scent-scale (pl. xxv, fig. 69). Similar to *persephone*, but shorter and narrower.

Genitalia:—

Valve (pl. xii, fig. 71). Apical process long and finger-like. Dorsal edge nearly straight, posteriorly rounded. Ventral fold broad, with weak proximal edge. Cavity with large flap.

Habitat.—South-west British New Guinea: Aroa River, November, January—April. Angabunga River, 6,000 feet, November—February.

North-east British New Guinea: Rawlinson Mountains; Simbang; Sattleberg, January.

North British New Guinea: Biagi, 5,000 feet, March; Hydrographer Mountains, 2,500 feet, January—May; Mount Alexander to Mount Nesbit; Honicote Bay to Owen Stanley Range.

South-east British New Guinea: Panaiti; Milne Bay, October.

Goodenough Island, 2,400—2,500 feet, May.

Types ♂ ♀ in Mus. Brit. from Port Moresby.

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72 (145). *D. ornytion rosselana* J. and T. (1916).

Joicey and Talbot **107**, p 446 (Rossell Island) ♂ ♀.

A slightly differentiated race in which the red submarginal line on the hind wing is much heavier. Some specimens are not truly distinguishable from the typical form.

A further differentiating character is found in the *scent-scale* (pl. xxv, fig. 70). This is distinctly narrower in *D. ornytion* but of about the same length.

Habitat.—Islands off South-east British New Guinea. Rossell Island: Mount Rossell, 2,100 feet, November—December, 1915 (W. F. Eichhorn).

St. Aignan: September and October (Meek).

Sud Est: Mount Riu, 2,000 feet, April (Eichhorn Bros.).

Types in Hill Museum.

73. **D. DOHERTYI** Ob.

This species is entirely white on the upperside, without any apical black on the fore wing. The hind wing below is without a red submarginal line. The ♀ is smoky-black above, with ashy-grey basal powdering.

A rare species known chiefly by specimens from Biak where Pratt Bros. took a small series.

The scent-scale indicates affinity with *funera* and *ornytion*. The uncus indicates more affinity with the latter.

The species is known only from Jobi and the Schouten Islands.

73 (146). *D. dohertyi dohertyi* Ob. (1894).

Pieris dohertyi Oberthür **158**, p. 6, pl. ii, fig. 2 (Jobi) ♂.

Huphina dohertyi Fruhst, **68**, p. 147.

Aoa dohertyi de Nicév. **153**, p. 155.

Delias dohertyi Ob., Dixey, *Trans. Ent. Soc. Lond.*, pp. 122-123 (1918).

It is strange how de Nicéville was led to include this species together with *discus* Honr. (species he admits not having seen) in his genus *Aoa*, which probably sinks to *Huphina*.

♂. Upperside white. Fore wing with costa finely black, some black powdering on the costal apical margin, vein 9 black; fringe of outer margin of both wings black.

Underside of fore wing white; costa brownish black; apical area

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between costa and vein 5 brownish black, not reaching the cell and only slightly extended into cellule 5, and mixed with the white ground-colour. In the figure of the type this area is more reduced than in the paratype before us. A few indistinct subapical yellow spots sometimes absent.

Hind wing black with long red subcostal stripe. An indistinct marginal border of grey powdering, some bluish white scaling at the base of cell and of costa, and some yellow scaling in the praecostal area.

Length of fore wing, 36 mm.

♀ unknown.

Habitat.—Jobi Island in Geelvink Bay. Only known by some specimens collected by Doherty at Ansus in 1892. Type in Mus. Tring.

73 (147). *D. dohertyi knowlei* J. and N. (1916) (pl. xliii, fig. 3 ♂, 4 ♀).

Joicey and Noakes 106, p. 182, pl. xxii, fig. 5 ♂, 6 ♀ (Biak).

♂. A slightly differentiated race. Upperside as in typical form. Underside of fore wing with black apical area more extended proximad and more densely black; it bears three or four well-developed greenish-yellow spots, the one in 6 much longer than the others.

Hind wing with a more strongly developed, though still lightly scaled, grey marginal border which extends also along the inner margin.

♀. Upperside smoky-black. Fore wing with proximal area to end of cell and below cell as far as vein 4 powdered with ashy-grey. Hind wing with similar grey powdering over the cell and in areas 1c—3, and near the margin in areas 4 and 5.

Underside as in the ♂ except with more extended black apical area on fore wing.

Scent-scale (pl. xxvi, fig. 79). Resembles *ornytion*, but is longer with a narrower neck.

Genitalia:—

Valve (pl. xii, fig. 72). Apical process of moderate length, narrow and finger-like. Dorsal edge slightly excurved, posteriorly rounded. Ventral fold rather weak. Cavity with large flap.

Uncus (pl. iii, fig. 67). Type of Group 1D. Middle lobe long, broad and triangular, its apex curved inward. Outer lobes rather broad and rounded. Tegumen incurved, but excurved posteriorly.

Lamina dentata (pl. vi, fig. 16). Size moderate. Lobes oblique, directed forward. Middle of anterior margin strongly incurved, of the posterior margin nearly straight. Teeth moderate, distal

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ends of lobes unarmed. Length = *circ.* 1·1 mm., breadth = *circ.* 0·16 mm.

Habitat.—Schouten Islands, N.E. New Guinea. Discovered by A., C., and F. Pratt on Biak Island in May and June, 1914. We figure the types which are in the Hill Museum.

74 (148). **D. PROUTI** J. and T. (1923).

Joicey and Talbot **109**, p. 25 (Buru) ♂ ♀ ; **110**, p. 508, pl. vi, figs. 1, 2.

One of the most magnificent of all Delias, another discovery of the brothers Pratt.

Easily distinguished by the heavy red postdiscal hind wing band, fairly straight and bordered proximally with black, the distal area being bright yellow (♂) or grey-white (♀).

♂. Upperside white. Costa and outer margin of fore wing and outer and inner margin of hind wing very narrowly edged with black. Fringes black. Underside of fore wing with black ground-colour, a grey-white basal half, a band of large yellow apical spots separated by the black veins and sometimes extended to the tornus. Hind wing with a long vermilion subcostal stripe almost filling the grey-white area of cellule 7. A vermilion postdiscal band, unbroken, straighter and thicker than in *joiceyi* ; this band bordered proximally by a black band usually wider, extending from the costa to inner margin. Proximal area greenish yellow, distal area bright yellow, paler near the red band.

♀. Upperside black with the basal area of both wings dusted with grey-white mixed with yellow. Fore wing with five very pale yellow subapical spots in 3, 4, 5, 6 and 8, divided by the veins.

Underside as in the ♂, but fore wing with larger yellow patches and basal area more yellow than grey. Hind wing with distal area stone-grey, the margin slightly washed with yellow.

Length of fore wing, ♂ ♀, 32—36 mm.

Scent-scale (pl. xxxvi, figs. 73, 74). Longer and narrower than *duris* and others of the group.

Genitalia:—

Valve (pl. xii, fig. 73). Apical process moderately long and narrow. Dorsal edge nearly straight, posteriorly well rounded. Ventral fold only defined posteriorly. Cavity with large flap.

Uncus (pl. iii, fig. 68). Type of Group 1D. Middle lobe long, broad and triangular. Outer lobes rounded and moderately

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broad, process rather small. Tegumen gently incurved, posteriorly excurved. A long narrow type.

Habitat.—West Central Buru, Gamoe 'Mrapat 5,000 feet, April, 1922; a small series of ♂ ♂ and a few ♀ ♀. Also 1 ♂ from the River Pohatiga, 8,000 feet, April.

Types in the Hill Museum.

75 (149). **D. EXIMIA** Roths. (1925) (pl. lvi, fig. 5).

Rothschild **182**, p. 677 (New Ireland) ♂.

A very distinct species, unique among Delias in having the cell of the fore wing below entirely red.

♂. Upperside white. Fore wing with black distal area extending to the discocellulars and narrowing to the tornus; costal margin black to the base. Hind wing with broad (about 6 mm. on vein 4) black outer border from apex to inner margin.

Underside black. Fore wing with the cell brick-red, this colour also extending to the area between cell and costa, and sometimes into cellule 3. Inner margin grey-white.

Hind wing with a broad brick-red subcostal stripe. Base of wing greenish yellow.

Length of fore wing, 31—33·5 mm.

Scent-scale (pl. xxxvi, fig. 75). Somewhat resembles *funerea*, but is narrower and not excurved posteriorly.

Genitalia:—

Valve (pl. xii, fig. 74). Apical process short and narrow. Dorsal edge nearly straight, slightly rounded posteriorly. Ventral fold moderately broad with defined proximal edge. Cavity not seen.

Uncus (pl. iii, fig. 69). Type of Group 1D. Middle lobe long and triangular, outer lobes broad and rounded. Tegumen incurved and oblique.

Habitat. New Ireland, December, 1923. Described from 10 ♂ ♂ collected by A. F. Eichhorn.

Type in Mus. Tring.

76 (150). **D. DURIS** Hew. (1861) (pl. lvi. fig. 1 ♂).

Hewitson **93**, fig. 34 ♂ (Ceram) (Pieris); Voll. **226**, p. 38 (Pieris); Wallace **228**, p. 358 (Thyca); Ribbe **163**, pp. 193, 200, 203, 216; Mitis **137**, pp. 111, 149 (♀); Butl. **14**, p. 151; Fruhst. **68**, p. 128, t. 53d ♂ ♀; Roths. **179**, p. 110; Talb. **221**, p. 404.

Form *aleria* Fruhstorfer, Seitz' *Macrolep.* ix, p. 128 (1910).

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This species is recognized by the hind wing having the discal area red, and by the fore wing having the cell yellow. It is fairly common in Ceram where a series of both sexes was taken by the Pratts, who also found the pupa.

♂. Upperside creamy-white. Fore wing with costa and outer margin narrowly black, more heavily so in the apical area. Hind wing with outer margin narrowly bordered with black, more heavily so below vein 3.

Underside of fore wing with ground-colour brownish black. The cell, the base of cellules 8 and 9, a spot in base of 5, and four or five subapical spots yellow; the subapical spot in 6 is longer than the others. Inner margin white, and areas 1b and 1c dusted with white for the greater part, sometimes extending into the base of 2.

Hind wing with black ground-colour, the base, including costa and the whole of the inner margin greenish yellow. A red subcostal stripe almost touching the first bar of a narrow red submarginal band; this band is somewhat irregular but is parallel to the margin; it is traversed by the black veins, and its outer edge below vein 6 is indented on the folds. Some scattered marginal grey-white or yellow scaling. The discal area to beyond the cell is dark red, the red scales being laid on more thinly, the veins remaining black; this area is of variable extent and density, being sometimes nearly black, and in other cases extended almost to the submarginal band. The variation with increased red discal area was named *aleria* by Fruhstorfer but one cannot draw the line. If the red had been so increased that the submarginal band and the subcostal stripe became merged with it, we should have a definite form.

♀. Upperside black. Proximal area of both wings grey-white with a yellow tinge, thinning out distally, and sometimes extended to the submarginal spots on the fore wing. Fore wing with a characteristic grey-white dot on the lower discocellular, and a series of seven grey-white (sometimes yellow-tinged) submarginal spots decreasing in size posteriorly, those below vein 3 sometimes mere dots.

Underside very similar to the ♂. Fore wing with the yellow subapical spots extended to form a band reaching usually the submedian. Hind wing red discal area more extended than in the ♂.

Length of fore wing, ♂ ♀ 37 mm. on the average.

Pupa (pl. liii, fig. 10). Much the same as *joiceyi*, but the head process with a longer bifurcation, measuring about 5 mm. across the fork.

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Scent-scale (pl. xxxvi, fig. 76). Somewhat like *eximia* but longer, more tapering, and broader at the base.

Genitalia:

Valve (pl. xii, fig. 75). Apical process short and narrow. Dorsal edge nearly straight, posteriorly rounded. Ventral fold broad and weak. Cavity not seen.

Uncus (pl. iii, fig. 70). Type of Group 1D. Middle lobe long and triangular, outer ones rather broad and rounded. Tegumen strongly incurved.

Lamina dentata (pl. vii, fig. 42). Long and moderately narrow, distal ends rounded. The middle of anterior margin incurved, of the posterior margin strongly excurved.

Teeth strong on the margins, leaving unarmed central and distal areas. Length = *circ.* 1·1 mm., breadth = *circ.* 0·25 mm.

Habitat.—Ceram, on the coast and up to 6,000 feet. Taken by the Pratts from October to December at elevations of from 2,500—6,000 feet on the Manusela range.

Holotype in Mus. Brit. Neallotype ♀ (described by Mitis) is probably in the Mus. Berlin.

77. D. FUNEREA Roths.

A rare species allied to *duris*. The hind wing below is coloured a dark sepia-brown (not black as in published description), on which the only marking, besides the red subcostal stripe, is a red submarginal line either composed of lunulate spots or continuous and strongly waved.

Two races are known, from Halmaheira and Buru.

77 (151). *D. funerea funerea* Roths. (1894).

Rothschild **174**, p. 662 (Halmaheira) ♂ ; **180**, p. 176, ♀ ; Smith & Kirby **201** p. 20, *Del.* vi, figs. 1, 2 ♂ ; Butler **14**, p. 151.

D. plateni Stgr. **213**, p. 355, ♂.

(Original description).

"♂ Upperside: Pure white. Underside: Fore wing white, costa and apical third black crossed by an oblique row of five large white spots.

"Hind wing black, with a red oblong streak half an inch long starting from the base, and a submarginal row of lunulated scarlet spots, seven in number.

"Head, thorax and abdomen white.

"Expanse: 3½ inches = 89 mm." (The underside of hind wing is not black).

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" ♀. Above, fore wing sooty black-brown, powdered with greyish white in basal $\frac{1}{3}$ of wing, on basal $\frac{1}{3}$ of costa area, and densely so along whole of vein 1, a subterminal row of eight greyish white patches. Hind wing sooty black-brown; fringe and abdominal folds whitish grey, basal half of wing powdered thinly with whitish grey. Below, fore wing as above, but basal $\frac{1}{2}$ strongly powdered with pale grey; cell and second to fifth subterminal patches suffused with lemon-yellow. Hind wing black-brown; a large subcostal patch and a subterminal band of coalescent sagittate patches scarlet; abdominal folds and wings beyond scarlet band strongly suffused with grey; base sulphur-yellow."

Habitat.—Halmaheira. The type ♂ was taken by W. Doherty in August, 1892, and is in Mus. Tring. Neallotype ♀ in coll. Adams (Mus. Brit.). Type of *plateni* in Mus. Berlin. We know of no other specimens.

77 (152). *D. funerea buruana* Roths. (1899) (pl. lvi, fig. 3 ♂).

Rothschild **177**, p. 68 (Buru) ♂; **179**, p. 110, ♀.

D. persephone serrata van Eecke, *Faun. Buru.*, *Treubia* vii, liv. 4, p. 353, pl. viii, fig. 1 ♂, 2 ♀ (1929).

Distinguished by the black apex of fore wing which also bears yellow spots below.

♂. Upperside white, fringes black. Fore wing with costa narrowly black, apex at the costa black above vein 7, sometimes extended to vein 6.

Underside of fore wing white, costa and apical area to vein 4 or below it blackish brown. Four greenish yellow subapical spots, and slight yellow basal scaling in the cell. Hind wing dark sepia-brown with slight yellow basal scaling. The usual red subcostal stripe. Red submarginal line strongly waved and continuous from costa to submedian where it is separated from a short bar below this directed proximad; in area 1c there is a broad bar or some red scaling connected with the submarginal line. Some scattered grey-white scaling over the inner margin and along the outer margin to a variable extent.

♀. Upperside of fore wing with extended black apical area, its edge being nearly straight or slightly curved, and traversing cellule 4. Two small grey subapical spots. Hind wing grey with large black apical area extending to base of cellule 6 and to vein 5 or below it. Underside as in the ♂.

Length of fore wing, ♂ ♀, 34—37 mm.

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Scent-scale (pl. xxvi, fig. 78). Similar to *nigrina* but less broad posteriorly.

Genitalia :—

Valve (pl. xii, fig. 76). Apical process short and moderately broad. Dorsal edge nearly straight, shortly excurved posteriorly. Ventral fold narrow. Cavity not seen.

Uncus (pl. iii, fig. 71). Type of Group 1E. Middle lobe long, broad and triangular, outer ones short and broad. Tegumen gently incurved.

Habitat.—Buru. A short series of both sexes was taken by the brothers Pratt at Kako Tagalago, 2,700 feet, May, 1922; River Pohatiga, 3,000 feet, April; Koentoeren, 3,000 feet, May.

The ♂ type was taken on Mount Mada, 3,000 feet, September, 1898. The ♀ neallotype was taken at Wahai, North Ceram, by Dr. E. Stresemann.

The specimens of *serrata* were collected by Mr. L. J. Toxopeus at Lake Rana, May, Nal 'Besi, May and June, Fakal, November, Wa 'Temun, February.

Types in Mus. Tring. Type of *serrata* in Mus. Leiden. The Ceram ♀ agrees exactly with Buru females. Dr. Stresemann did not visit Buru.

78 (153). **D. NIGRINA** Fabr. (1775) (pl. lvi, fig. 2 ♂).

Fabricius **40**, p. 475 (S. Australia) ♀; **41**, p. 46; **42**, p. 21; **43**, p. 200; Donov. **28**, pl. 19, fig. 1; Godt. **74**, pp. 113, 149 (Pieris); Hübn. **100**, t. 335 (Voracia); Swain. **219**, pl. 69 (Pieris); Boisd. **1**, p. 52 (Pieris); Lucas **127**, p. 61, pl. 31, fig. 2 (Pieris); Boisd. **2**, p. 459 (Pieris); Doubl. and Hew. **30**, p. 45 (Pieris); Wallace **228**, p. 350 (Thyca); Butl. **9**, p. 36 (Delias); **14**, p. 151; Stdgr. **208**, p. 35, t. 20 ♂ ♀ (1884); Seitz, *Ent. Zeit. Stett.* **53**, p. 229 (1892); Mitis **137**, p. 104; Fruhst. **68**, p. 133, t. 53c ♂ ♀; Waterh. and Lyell **231**, p. 139, fig. 521 ♀, P521 (pupa).

Bionomics.—Longstaff, *Butterfly-hunting in many Lands*, pp. 484, 513, 535 (1912).

Scales.—Watson, *Mem. Litt.* and *Phil. Soc. Man.* 3rd ser. vol. ii, p. 70; Dixey, *Proc. Ent. Soc. Lond.* 1909, p. cxiii.

D. nigrina is a well-known Australian species to be found in all collections. The underside pattern conforms to the type of the group. Fore.wing with large yellow subapical spots. Hind wing with a post-discal red line and grey discal and submarginal scaling on a black ground.

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♂. Upperside white. Fore wing with black apical area which does not reach the cell nor the tornus. Three or four white subapical spots of variable size. Costa narrowly black. Fringes of both wings black.

Underside of fore wing blackish brown, darker over the apical area. Inner margin grey-white to the cell and sometimes similar dusting in cellule 2. Subapical spots yellow, large, four or five, sharply defined, the one in 6 the longer and proximally pointed.

Hind wing darker blackish brown than the fore wing. A short red subbasal stripe in 7. A thick red postdiscal line formed of eight bars indicated by the veins, usually slightly broken at vein 6, extending from the costa to the first submedian and curved strongly distad between veins 4 and 6. Some grey-white scaling over the inner margin and outer half of cell, and a submarginal band of similar scaling placed near the postdiscal line. Margins of the wing narrowly edged with grey-white.

♀. Upperside black. Fore wing with the cell to a variable extent, proximal two-thirds of areas 1a and 1b, and usually a stripe in 2 grey with a greenish tinge. Five creamy-white subapical spots of moderate size, sharply defined on their inner edge which is slightly pointed, the one in 6 sharply pointed. Hind wing with the greater part grey with a greenish tinge, leaving a black distal marginal area of variable width.

Underside as in the ♂. The subapical spots of fore wing sometimes very large. Hind wing sometimes with increased grey-white scaling.

Length of fore wing, ♂ ♀, 29—34 mm.

Dr. Waterhouse informs us that two specimens are known in which the red band on the hind wing is yellow.

Pupa (pl. lxviii). Very similar to the pupa of *joiceyi* and *duris*. Orange-yellow with elevated black thoracic ridge. The anterior lateral spine on the second and third abdominal segments is longer and strongly curved. The head process measures about 4 mm. across the fork.

Larva (pl. lxviii). The following description was prepared by Dr. G. A. Waterhouse, to whom we are also indebted for the excellent figures we reproduce.

Head black with short white hairs; thorax dark brown, first segment with four long whitish bristles set in a yellow area, second and third with only two such bristles; abdominal segments (except the last which has four) with two long whitish bristles set in yellow areas; on most segments near the median dorsal line, smaller bristles set in yellow areas, laterally shorter white bristles set in yellow areas; lets and claspers black.

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Food plant *Loranthus* (mistletoe).

Scent-scale (pl. xxvi, fig. 72). Short and broad.

Genitalia:—

Valve (pl. xii, fig. 77). Apical process curved dorsad, of moderate length and width. Dorsal edge nearly straight, rounded posteriorly. Ventral fold very broad posteriorly, its proximal edge weakly defined. Cavity not seen.

Uncus (pl. iii, fig. 72). Type of Group 1D. Middle lobe broad, short and triangular, outer ones short and rounded. Tegumen strongly incurved.

Lamina dentata (pl. vi, fig. 12). Long with broad and rounded lobes. The middle area of anterior margin incurved with a slight central convexity, of the posterior margin sharply excurved. Teeth moderate, not numerous. A large distal area unarmed, and a larger middle area unarmed.

Length = *circ.* 1·2 mm., breadth = *circ.* 0·2 mm.

Habitat.—Australia: East coast, to about 50 miles south of Sydney. One of the few butterflies common at times during the winter months in Sydney (Waterhouse).

According to Waterhouse and Lyell, the species is recorded from Cape York, Cairns, Kuranda, Ingham, Brisbane, Richmond River, Kempsey, Port Macquarie, Manning River, Ourimbak, Sydney, Delawarra, Blue Mountains, at all times of the year.

Holotype ♀ in British Museum (coll. Banks).

Bionomics.—Dr. G. B. Longstaff (1912) notes that the ♂ "was thought by me to have a slight scent." He also states: "On March 30, 1910, at Como, 12 miles S. S. West of Sydney, New South Wales, I saw a number of males of *Delias nigrina* Fabr. flying about the tops of gum-trees (*Eucalyptus* sp.) that were in flower. They kept for the most part 30 or 40 feet from the ground, rarely coming down within reach. The upperside of the male is white with an apical black mark, the lower side mostly black. The effect of this strangely contrasted colouring was curious. The black and white surfaces showed alternately as it flew slowly about the flowers, and at first I took the butterfly for something much larger than it really was—to me it seemed a huge Papilio—I have seldom been so deceived in the size of an insect. The movement of both wings gave the butterfly a distinctly blue look, as might have been expected from the partial mingling of black and white."

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79 (154). **D. WOLLASTONI** Roths. (1915).

Rothschild 181, p. 8, pl. 1, fig. 20 ♂ (Snow Mountains).

We place this insect provisionally in this group as an outlying member. We do not know to what known species it is really allied as our knowledge of its structure is incomplete. Only the single type is known.

Distinguishing features of the hind wing pattern are the crimson-maroon subcostal patch, similarly coloured patch at the end of cell, and the submarginal band of similarly coloured spots.

(Original description).

"♂. This marvellous insect is unlike any known Delias.

"Upperside: Fore wing brown-black, lower $\frac{2}{3}$ of cell and basal $\frac{2}{3}$ of wing below cell greyish cream-white, a curved line of submarginal spots of same colour on veins 2 to 5 inclusive. Hind wing, basal $\frac{3}{4}$ greyish-white, outer $\frac{1}{4}$ brown-black, a greyish dot on veins 3 and 5.

"Underside: Fore wing, basal two-thirds obliquely except costa cream-white, cell golden-yellow, a broad black arrow-shaped patch at apex of cell, outer one-third black with broad curved subterminal band of golden spots. Hind wing golden olive-yellow powdered with black scales, a large crimson-maroon patch at base below costa, an antemedian greyish pink shaded curved band from costa to vein 1, beyond it a broad black band powdered with golden-olive and enclosing at end of cell a large crimson-maroon patch, a postmedian strongly curved band of somewhat irregular outline consisting of coalescent crimson-maroon patches reaching beyond vein 2, a submarginal greyish pink band, and an evanescent black marginal band to vein 2 much powdered with golden-olive.

"Expanse 61 mm. Length of fore wing 29 mm."

Genitalia.—As far as one can see the apical process of the valve is curved dorsad and is sharply pointed.

Habitat.—South Dutch New Guinea: Snow Mountains, on Carstenz Peak, 5,000—10,000 feet, one ♂ was taken between February and March, 1913, by the B. O. U. and Wollaston Expedition.

Type in Mus. Tring.

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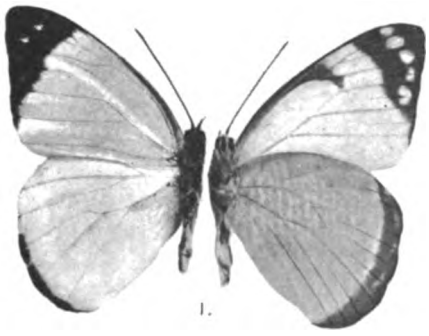
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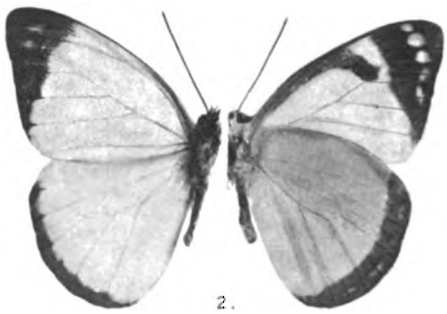
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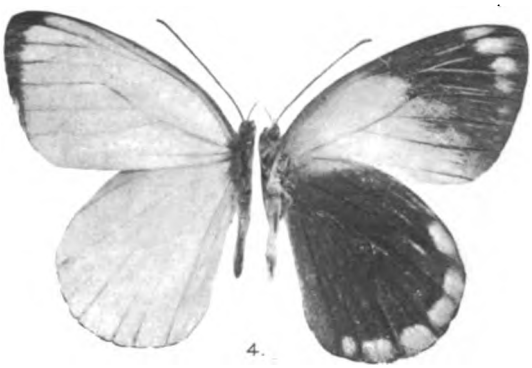
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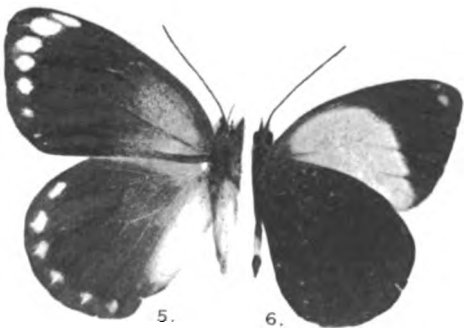
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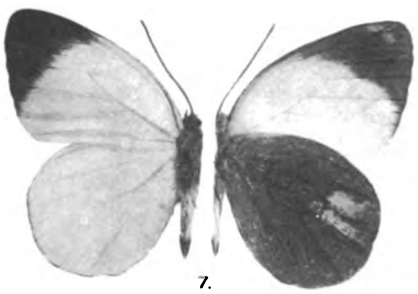
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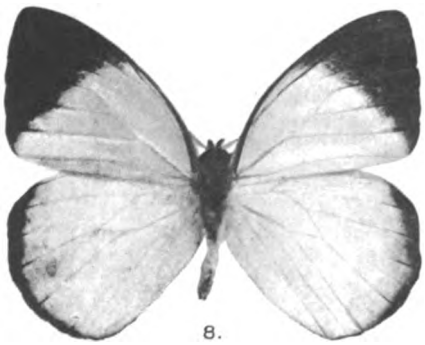
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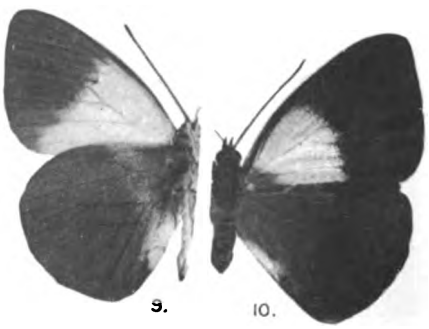
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EXPLANATION OF PLATE XL.

		Species No
Fig. 1.	*D. enniana ecceicei* J. and T., ♂ holotype...	47
,, 2.	*D. dice samarai* J. and T., ♂ holotype ...	48
,, 3.	*D.* ,, ,, J. and T., ♀ allotype.	
,, 4.	*D. talboti* J. and N., ♂ holotype ...	52
,, 5.	*D.* ,, ♀ allotype.	
,, 6.	*D. ladas ladas* Sm., ♂ holotype	55
,, 7.	*D. ladas waigeuensis* J. and T., ♂ holotype	53
,, 8.	*D. caliban satisbona* Roths., ♂	58
,, 9.	*D. totila* Hell., ♂	59
,, 10.	*D.* ,, ♀.	

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EXPLANATION OF PLATE XLI.

		Species No.
Fig. 1.	*D. stresemanni* Roths., ♂	61
,, 2.	*D.* ,, ♀.	
,, 3.	*D.* ,, f. *mediofasciata* Talb., ♀ holotype	63
,, 4.	*D. geraldina* Sm. ♂	68
,, 5.	*D.* ,, ♂.	
,, 6.	*D.* ,, ♀.	
,, 7.	*D.* ,, ♀ holotype.	
,, 8.	*D.* ,, ♀.	
,, 9.	*D. eudiabolus* Roths., ♀ allotype	69
,, 10.	*D.* ,, ♂.	
,, 11.	*D. flavopicta* Jord., ♂ holotype (*rothschildi* Kenr.)	73
,, 12.	*D. heroni* Kenr., ♀ neallotype	81
,, 13.	*D.* ,, *f. albo-oculatus* J. and N., ♀ allotype	82
,, 14.	*D. nigropunctata* J. and N., ♂ holotype ...	84
,, 15.	*D. thompsoni* J. and T., ♀ allotype	85
,, 16	*D. cuningputi fascelis* Jord., ♀	88

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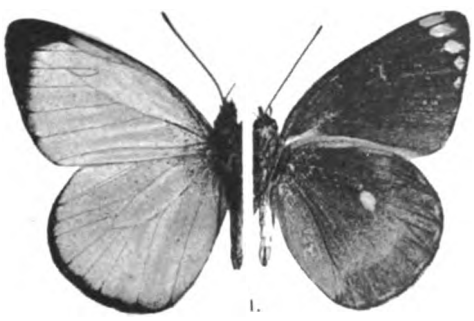
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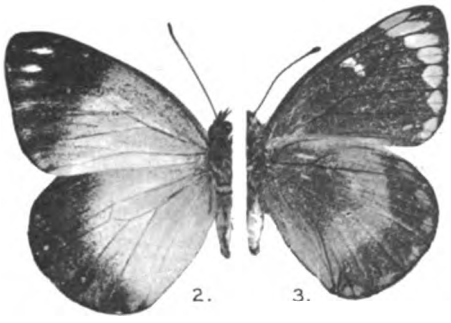
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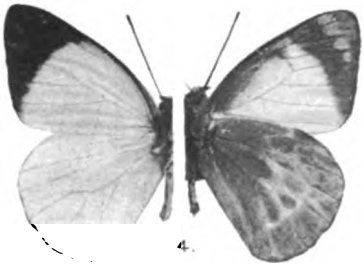
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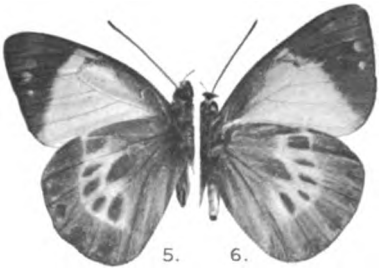
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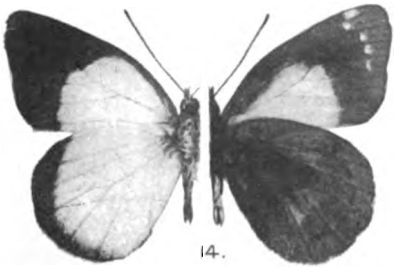
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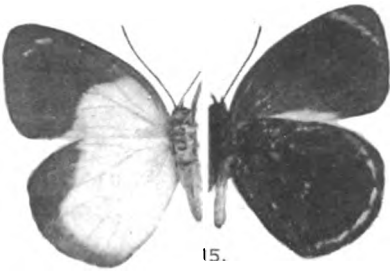
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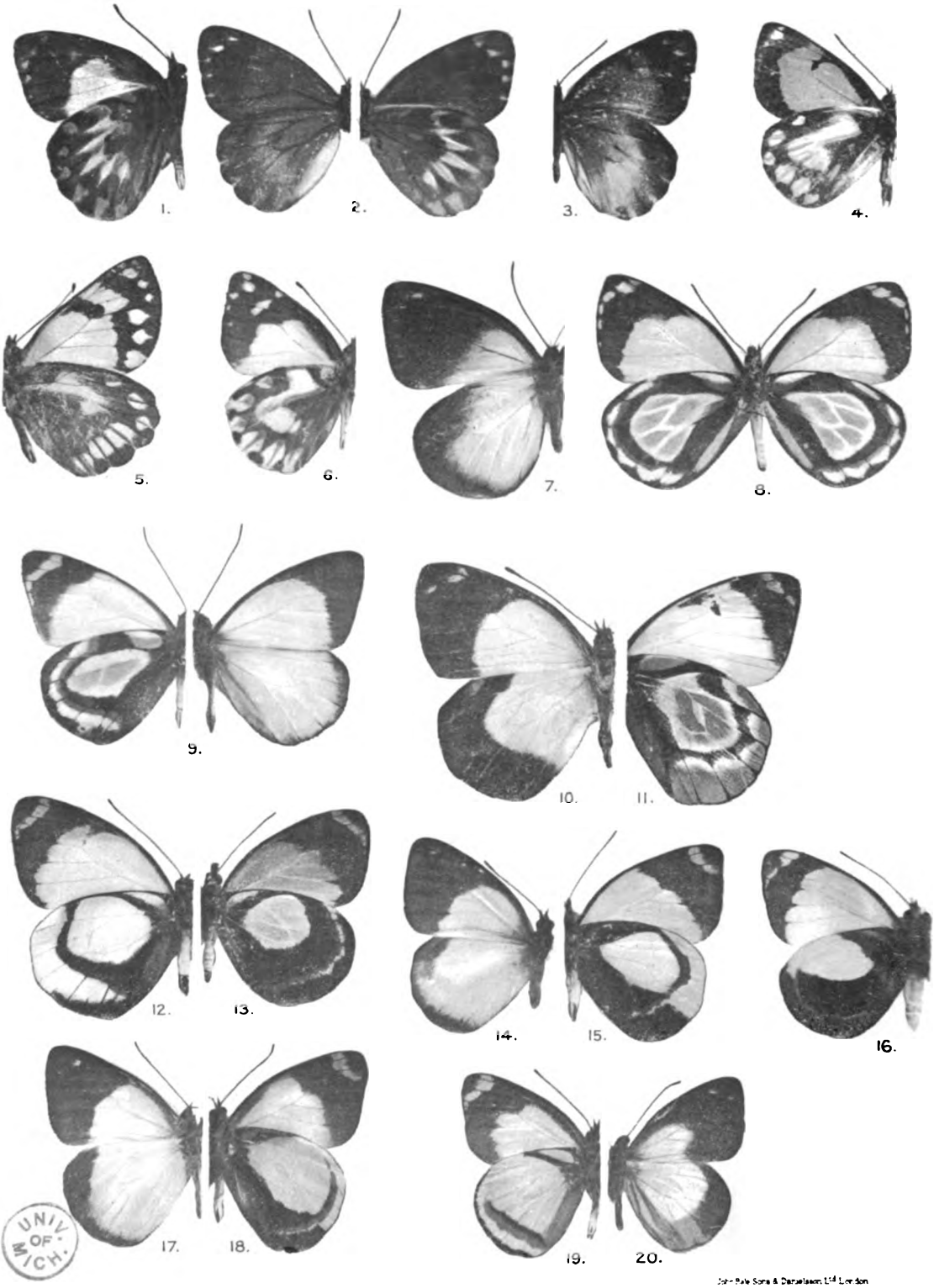

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EXPLANATION OF PLATE XLII.

		Species No.
Fig. 1.	*D. pheres* Jord., ♂	90
,, 2.	*D. fuliginosus* Kenr., ♀ allotype	98
,, 3.	*D.* ,, f. *ochraceus* J. and N., ♀ holotype...	99
,, 4.	*D. eichhorni frater* Jord., ♂	101
,, 5.	*D. leucobalia distincta* Roths., ♂	104
,, 6.	*D. catisa* Jord., ♂	105
,, 7.	*D. caroli wandammenensae* J. and T., ♀ allotype ...	110
,, 8.	*D. mesoblema* Jord., ♀	118
,, 9.	*D. bakeri* Kenr., ♂ holotype	119
,, 10.	*D. callista* Jord., ♀	120
,, 11.	*D.* ,, ♂.	
,, 12.	*D. hapalina conspectirubra* J. and T., ♂ ...	122
,, 13.	*D.* ,, ,, ♀.	
,, 14.	*D. isocharis isocharis* R. and J., ♀	136
,, 15.	*D.* ,, ,, ♂.	
,, 16.	*D. alepa kunupiensis* J. and T., ♂ holotype ..	139
,, 17.	*D. dixeyi* Kenr., ♀ neallotype	140
,, 18.	*D.* ,, ♂.	
,, 19.	*D. bothwelli* Kenr., ♂	141
,, 20.	*D.* ,, ♀ neallotype.	

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EXPLANATION OF PLATE XLIII.

		Species No.
Fig. 1.	*D. ornytion ornytion* G. and S., ♂ ...	144
„ 2.	*D. ornytion persephone* Stgr. ♀	143
„ 3.	*D. dohertyi knowlei* J. and N., ♂ holotype	147
„ 4.	*D.* „ „ ♀ allotype.	
„ 5.	*D. subnubila* Leech, ♂	157
„ 6.	*D. wilemani* Jord., ♂ neallotype ...	158
„ 7.	*D. subnubila* Leech, ♀	157
„ 8.	*D. wilemani* Jord., ♀	158

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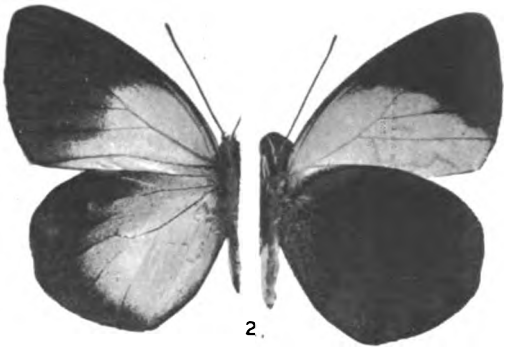

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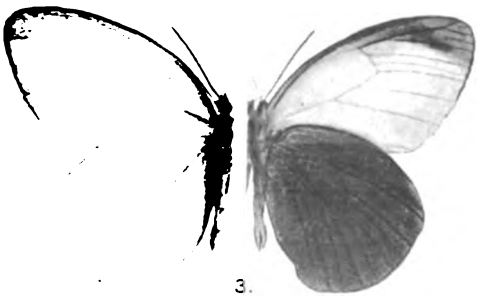

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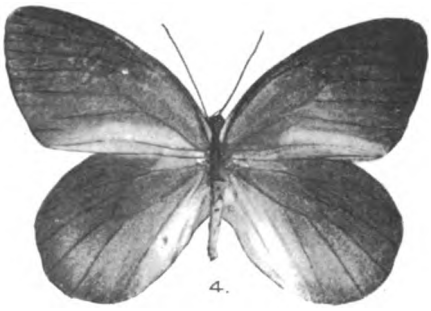

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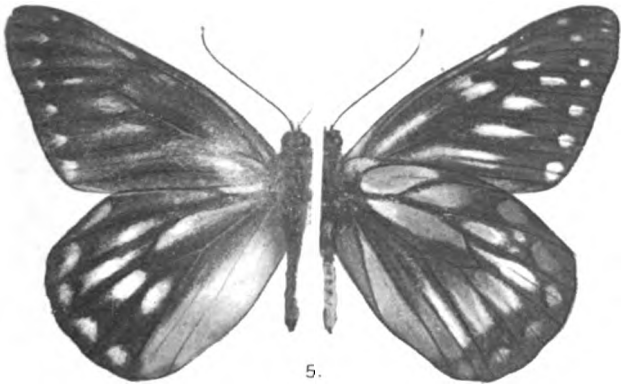

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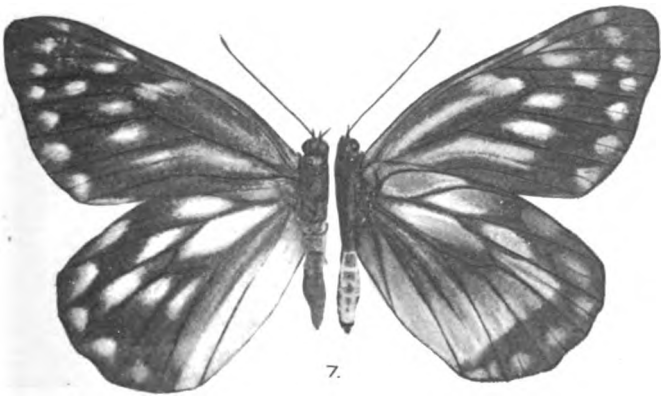

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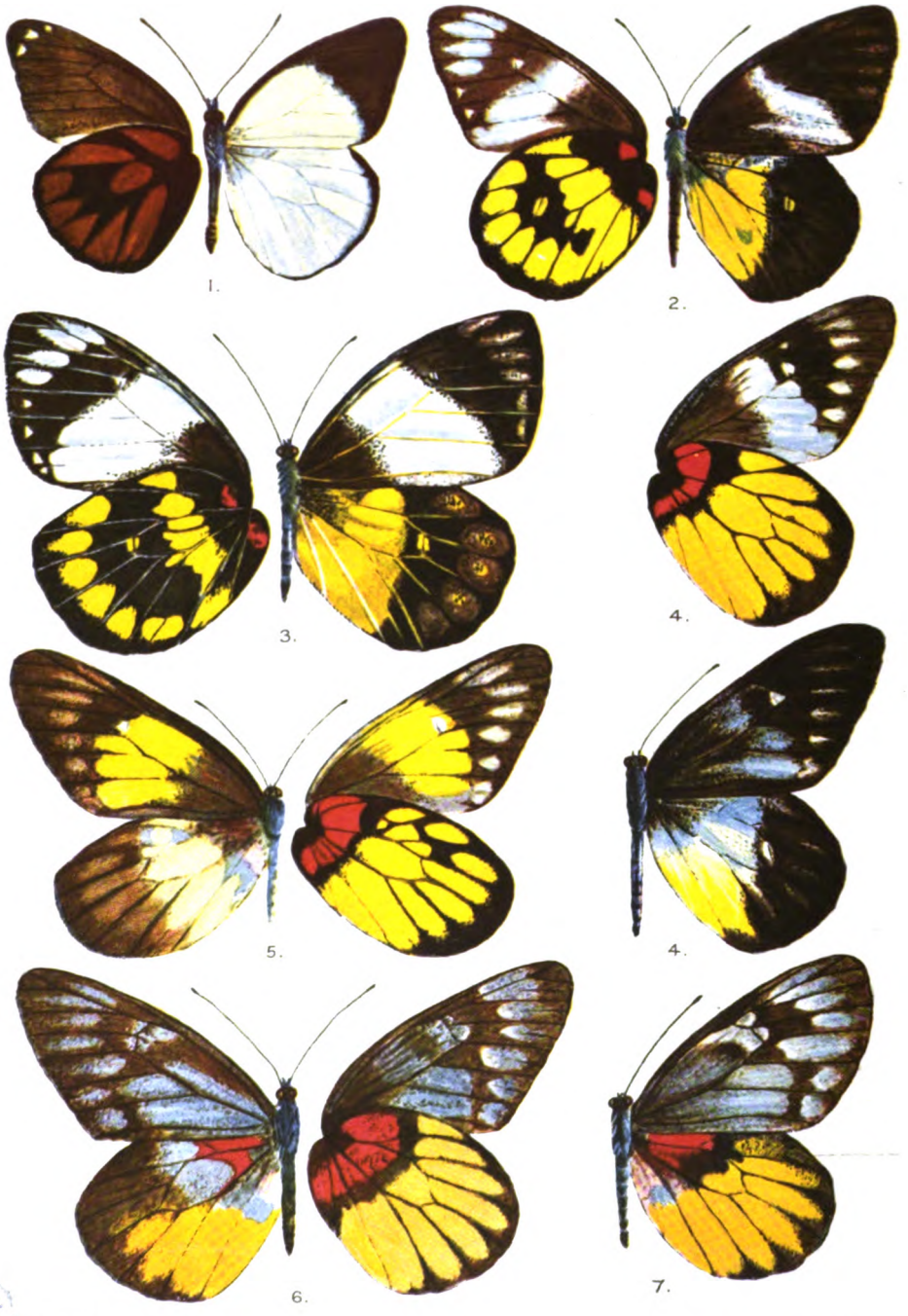

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EXPLANATION OF PLATE LVIII.

		Species No.
Fig. 1.	*D. nais nais* Jord., ♂	113
,, 2.	*D. woodi* Talb, ♂ holotype	183
,, 3.	*D.* ,, ♀ allotype.	
,, 4.	*D. aglaia goda* Fruh., ♂	202
,, 5.	*D.* ,, ,, ♀ f. *flavifascia* J. & T. ...	203
,, 6.	*D. ninus ninus* Wall., ♂ (Mt. Ophir) ...	212
,, 7.	*D.* ,, ,, ♀ (Perak).	

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EXPLANATION OF PLATE LIX.

		Species No.
Fig. 1.	*D. meeki meeki* R. and J., ♂	229
„ 2.	*D.* „ „ ♀.	
„ 3.	*D. meeki septentrionalis* Roths., ♀ allotype	230
„ 4.	*D. meeki neagra* Jord., ♂	231
„ 5.	*D. meeki arfakensis* J. and T., ♀ allotype ...	232
„ 6.	*D.* „ „ ♂ holotype.	
„ 7.	*D. niepelti* Ribbe, ♀	233
„ 8.	*D.* „ ♂.	

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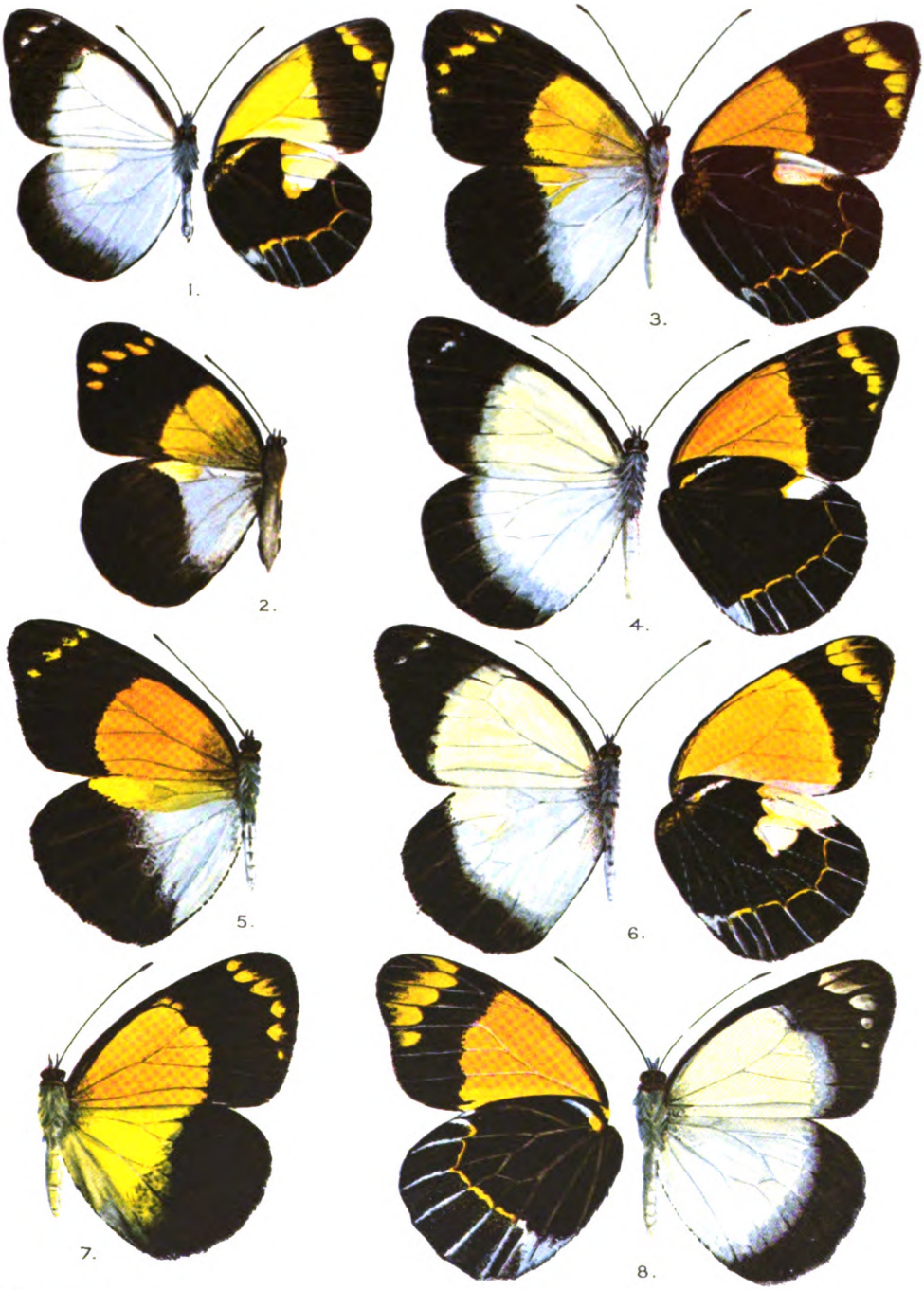

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